**1029 W. 3rd Avenue, Suite 500**
**Anchorage, AK 99501**

December 30, 2011

Ms. Hanh Shaw
Cook Inlet NPDES Permit Manager
U. S. Environmental Protection Agency, Region 10
1200 Sixth Avenue, M/S OWW-130
Seattle, Washington 98101.

**RE: Notice of Intent (NOI), NPDES General Permit AKG-31-5022 (RENEWAL)**
**Furie Operating Alaska, LLC, Cook Inlet Exploratory Drilling Program**
**Spartan 151 Mobile Offshore Drilling Unit (MODU)**

Dear Ms. Shaw:

Furie Operating Alaska, LLC (formerly known as: Escopeta Oil Company, LLC) is providing a Notice of Intent (NOI) for coverage under NPDES General Permit AKG-31-5000 regarding authorized discharges related to oil and gas exploration drilling to be conducted in state of Alaska coastal waters of the upper Cook Inlet. Drilling will be conducted by the Spartan 151 jack-up drill rig. This NOI is a Re-Application / Renewal of AKG-31-5022.

The purpose of the permit re-application is to allow Furie Operating Alaska, LLC to continue drilling activities in coastal waters, which starting in August 2011, for a five-year exploration period. This drilling program will consist of five (5) wells, the first well has been drilled to a depth of 8,805 feet and will be re-entered and completed in the spring of 2012. Depending on results, additional wells may be drilled. Furie Operating Alaska, LLC submits this NOI to satisfy the requirements of 40 CFR Part 435, Subparts A and D.

Completion of the NOI information is being provided by Furie Operating Alaska, LLC as prescribed by Permit AKG-31-5000/5022. This includes revisions and re-submission of the following:

- NOI Information Fact Sheet
- Exploration Plan (Attachment 1)
- Drilling Fluid Plan (Attachment 2)
- Environmental Monitoring Plan (Attachment 3)
- Best Management Practices Plan (Attachment 4).

If you have questions, please contact me at the office (907) 277-3726, or on my cellphone (907) 229-8398.

Best Regards,

Bruce D. Webb
V.P., Governmental and Regulatory Affairs
Furie Operating Alaska, LLC

Cc: Cindi Godsey, Environmental Engineer, USEPA – Alaska
Adele Fetter, Alaska DEC - Anchorage

# Notice of Intent Information Fact Sheet
# NPDES General Permit AKG-31-5022

## 2011 – 2016 EXPLORATION DRILLING PLAN

## FURIE OPERATING ALASKA, LLC
## KITCHEN LIGHTS UNIT

Kitchen Lights Unit #1
Kitchen Lights Unit #2
Kitchen Lights Unit #3
Kitchen Lights Unit #4
Kitchen Lights Unit #5

## NORTH COOK INLET, ALASKA


Operator:

FURIE
Operating Alaska LLC

Furie Operating Alaska, LLC
1029 W. 3rd Avenue, Suite 500
Anchorage, AK 99501

**December 30, 2011**

*Notice of Intent (NOI) Information Sheet provided by Furie Operating Alaska, LLC*
*NPDES General Permit AKG-31-5000 (AKG-31-5022)*
*Oil and Gas Exploration Facilities on the Outer Continental Shelf and Contiguous State Waters*

**Part I.D.3 - A complete NOI must contain the following information as illustrated in Appendix E Information Sheet.**

Furie Operating Alaska, LLC may opt to drill more than five exploration, therefore, Furie Operating Alaska, LLC is requesting permit coverage as a mobile facility, operating in the upper Cook Inlet area (see Figure 1 for a map of the area of coverage).

Additional information on the Spartan 151, facility contacts, and the latitude and longitude of the initial exploration well (plus the following four exploration wells) is presented below.

| | |
|---|---|
| Applicant (Owner/Operator): | |
| Owner Name: | Furie Operating Alaska, LLC |
| Telephone Number: | (907) 277-3726 |
| Operator: | Furie Operating Alaska, LLC |
| Telephone Number: | (907) 277-3726 |
| Operator Mailing Address: | 1029 W. 3rd Avenue, Suite 500<br>Anchorage, AK 99501 |
| Facility: | |
| Facility Name: | Spartan 151 |
| Contact Name: | Terry Parker |
| Telephone Number: | (985) 879-4552 |
| Beginning Date of Operation: | August 12, 2011 |
| Expected Duration of Operation: | 1,800 days |
| Facility Type: | Independent Leg Cantilever Jack-up Drilling Rig |
| Mobile Facility Locations: | Kitchen Lights Unit Wells #1, #2, #3, #4 and #5 |
| Initial Latitude: | 60* 56' 05.183" N, NAD 27 (initial well #1) |
| Initial Longitude: | 151* 09' 01.334" W, NAD 27 (initial well #1) |

Furie Operating Alaska, LLC is submitting a vicinity map showing general operations in North Upper Cook Inlet (Figure 1) plus a location map (Figures 2) for the well locations. A treatment process flow diagram also is provided (Figure 3) is also provided.

Preliminary locations for the initial five (5) Furie Operating Alaska, LLC wells are:

- More than 4000 meters from prohibited shoreline areas of discharge (Figure 2)
- In greater than 14 meters of water (Figures 3 to 6).
- North of the northern edge of Kalgin Island (Figure 1), except for the prohibited areas of discharge set forth in AKG-31-5000.I.C, the Proposed General Operating Area of Coverage:

Receiving Water:

Cook Inlet - Coastal Waters only

Proposed Location of Discharge within General Operating Area:

| **Well Name** | **ADNR Lease #** | **Water Depths below MLLW** |
|---|---|---|
| EOC Kitchen Lights Unit #1 | ADL – 389198 | 36 ft. to 132 ft. |
| EOC Kitchen Lights Unit #2 | ADL – 389198 | 36 ft. to 132 ft. |
| EOC Kitchen Lights Unit #3 | ADL – 389926 | 36 ft. to 132 ft. |
| EOC Kitchen Lights Unit #4 | ADL – 389924 | 36 ft. to 132 ft. |
| EOC Kitchen Lights Unit #5 | ADL – 389917 | 36 ft. to 132 ft. |

*Notice of Intent (NOI) Information Sheet provided by Furie Operating Alaska, LLC*
*NPDES General Permit AKG-31-5000 (AKG-31-5022)*
*Oil and Gas Exploration Facilities on the Outer Continental Shelf and Contiguous State Waters*

| Discharges | | **Kitchen Lights Unit Wells #1 through #5** | |
|---|---|---|---|
| 001 | Drilling Mud and Cuttings | Water Depth: | 72 feet, average |
| 002 | Deck Drainage | Water Depth: | 72 feet, average |
| 003 | Sanitary Waste | Water Depth: | 72 feet, average |
| 004 | Domestic Waste | Water Depth: | 72 feet, average |
| 005 | Desalination Unit Waste | Water Depth: | 72 feet, average |
| 006 | Blowout Preventer Fluid | Water Depth: | 72 feet, average |
| 007 | Boiler Blowdown | Water Depth: | 72 feet, average |
| 008 | Fire Control System Test Water | Water Depth: | 72 feet, average |
| 009 | Non-Contact Cooling Water | Water Depth: | 72 feet, average |
| 010 | Uncontaminated Ballast Water | Water Depth: | 72 feet, average |
| 011 | Bilge Water | Water Depth: | 72 feet, average |
| 012 | Excess Cement Slurry | Water Depth: | 72 feet, average |
| 013 | Mud, Cuttings, Cement at Seafloor | Water Depth: | 72 feet, average |
| 014 | Waterflooding Discharges | Water Depth: | 72 feet, average |
| 015 | Produced Water & Produced Sand | Water Depth: | 72 feet, average |
| 016 | Completion Fluids | Water Depth: | 72 feet, average |
| 017 | Workover Fluids | None. Not included (See Attachment 1) | |
| 018 | Well Treatment Fluids | None. Not included (See Attachment 1) | |
| 019 | Test Fluids | None. Disposed onshore at approved facilities | |

Type Of Sanitary Discharge: Treated human and domestic wastes.

Treatment Process(es) and Disposal Practices: Furie Operating Alaska, LLC is providing a brief description of the treatment process(es) and disposal practices in attached Table 1.

Flow Diagram of Discharge Waste Streams: A treatment process flow diagram is provided (Figure 3). Waste and potential discharges (outfalls) associated with the project are further described in attached Table 1. The treatment process flow diagram includes intake sources, operations contributing to the effluent, and treatment units labeled to correspond to the discharges (001 to 019) where applicable. Table 1 includes information the nature and amount of discharges and/or waste, as well as collection, storage, disposal and/or treatment measures.

Drilling Fluid

Category *(Check all that apply)*:
- ►Water-based
- Oil-based
- Synthetic-based
- Other

Group *(Check all that apply)*:
- Lignosulfonate
- Lime
- Gyp
- ►Sea Water
- ►Saltwater
- ►Saturated Saltwater
- ►Nondispersed (Viscosifeir/Polymer)

Estimated Drilling Fluid Discharge Volume/Well: 35,000 bbls/well (will not exceed 750 bbls/hr)

Estimated Total Discharge Volume/Well: Please see Table 1 (attached)

*Notice of Intent (NOI) Information Sheet provided by Furie Operating Alaska, LLC*
*NPDES General Permit AKG-31-5000 (AKG-31-5022)*
*Oil and Gas Exploration Facilities on the Outer Continental Shelf and Contiguous State Waters*

100-Meter Mixing Zone Request

A mixing zone is not being requested from ADEC. Sanitary discharges will be treated in an approved Marine Sanitation Device (MSD) and the effluent will be treated through a dechlorination device prior to discharge. The residual chlorine (sodium hypochlorite) will be less than .005 ppm.

Special Conditions: *(Provide justification for all that are not required, completed or provided)*

| | |
|---|---|
| Special Monitoring: | (Not Required within Alaska coastal waters) |
| Exploration Plans: | (Attachment 1 to NOI Info Fact Sheet) |
| Biological Survey(s): | Beluga Whale Monitoring, see Plan of Op's. |
| Environmental Reports(s): | (Not Required within Alaska coastal waters) |
| Drilling Fluid Plan: | (Attachment 2 to NOI Info Fact Sheet) |
| Environmental Monitoring Study Plan (II.B.5): | (Attachment 3 to NOI Info Fact Sheet |
| Best Management Practices Plan (IV.A): | (Attachment 4 to NOI Info Fact Sheet |

Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete, I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Based on my signature below, I also certify that a Best Management Practices (BMP) Plan for this facility is complete, on-site, and available upon request by EPA. The BMP includes this NPDES permit number and is signed by an authorized representative of *Furie Operating Alaska, LLC*.

Signature:  Date: December 30, 2011

Printed Name: Bruce D. Webb Title: V.P., Gov. and Reg. Affairs

Mail Completed NOI to EPA and ADEC at the following addresses:

USEPA
1200 6th Avenue, Suite 900, M/S OWW-130
Seattle, WA 98101

ADEC, Water Division
555 Cordova Street
Anchorage, Alaska 99501

| Table 1: Discharge and Waste Management Plan | | | |
|---|---|---|---|
| **Discharge Type** | **Waste Composition** | **Est. Amount** | **Storage/Disposal** |
| 001 Drilling | Water-based drill fluids | 35,000 bbls/well | Recycle/reuse drilling fluids after solids control. Store up to 750 bbls in upright storage tanks to ensure <750 bbls/hr discharge. Discharge via shuntline below inlet water surface. Free of hydrocarbons. |
| 001 Drilling Cuttings | Cuttings above hydrocarbon zones coated with water-based drill muds | 30,000 bbls/well | Store up to >2000 bbls onboard in mud pits, sand trap, and desilter and trip tanks. Discharge via shuntline below water surface. Free of hydrocarbons. |
| 002 Deck Drainage | Fresh water or seawater | 100 bbls/day | Discharge uncontaminated water overboard to surface.<br>Treat water coming into contact with other fluids by processing oil-water separator prior to discharge by shuntline. Free of hydrocarbons. |
| 003 Sanitary Waste | Human waste | 100 bbls/day | Treat prior to discharge with MSD and dechlorination, shuntline below water surface. No solids or foam discharge. |
| 004 Domestic Waste | Gray water | 500 bbls/day | Treat prior to discharge with MSD and dechlorination, shuntline below water surface. No solids or foam discharge. |
| 005 Desalination Unit Waste | Rejected brine from water maker unit | 200 bbls/day | Discharge via shuntline below water surface. Free of hydrocarbons. |
| 006 Blowout Preventer Fluid | Fluids generated during blowout | 0 bbls/day | No discharge unless during well control emergency; discharge via diverter system over side of drill deck. Free of hydrocarbons. |
| 007 Boiler Blowdown | Fresh water discharge to control solids in boilers | 100 bbls/day | Discharge via shuntline below water surface. Free of hydrocarbons. |
| 008 Fire Control System Test Water | Treated seawater | 2,000 bbls/test | No regular discharge (only in case of fire, blowout or system test).<br>Discharge overboard or discharge into deck drainage, treat by processing through oil-water separator and then discharge by shuntline. |
| 009 Non-contact Cooling Water | Treated seawater | 50,000 bbls/day | Discharge via shuntline below water surface. |
| 010 Uncontaminated Ballast Water | Cook Inlet seawater used for preload | 1.8 MM bbls/ preload cycle | Discharge transit water prior to entering Cook Inlet (see BMP Plan for details). Then discharge Cook Inlet seawater via shuntline below water surface. |
| 011 Bilge Water | Treated fresh water and seawater | 10 bbls/day | Treat prior to discharge shuntline below water surface |
| 012 Excess Cement Slurry | Excess cement | 200 bbls/day | Discharge via shuntline below water surface. Free of hydrocarbons. |
| 013 Muds, Cuttings, Cement at Seafloor | Water-based muds coating cuttings above hydrocarbon zones, extra cement | 35,000 bbls/well | Discharge via shuntline below water surface. Free of hydrocarbons. |
| 014 Waterflooding Discharges | Treated seawater | 500 bbls/day | Discharge via shuntline below water surface. Free of hydrocarbons. |
| 015 Produced Water & Produced Sand | Hydrotest water, fluids & solids | 200 bbls/day | Discharge via shuntline below water surface. Free of hydrocarbons. |
| 016 Completion Fluids | Solids-free liquids (typically brines) | 250 bbls/day | Discharge via shuntline below water surface. Free of hydrocarbons. |
| 017 Workover Fluids | Brines | 100 bbls/day | Discharge via shuntline below water surface. Free of hydrocarbons. |
| 018 Well Treatment Fluids | Fluids used increase productivity from hydrocarbon zones | 100 bbls/day | Treat prior to discharge shuntline below water surface. Free of hydrocarbons. |
| 019 Test Fluids | Fluids sent downhole during testing with formational water. | 500 bbls/day | Discharge via shuntline below water surface. Free of hydrocarbons. |
| Not allowed under *AKG-31-5000* | Cuttings in Hydrocarbon Zones | No discharge. Recycle/reuse drilling fluids after solids control. Store up to 500 bbls in upright storage tanks and transport for onshore by G&I in Class 2 injection well. | |
| Not allowed under *AKG-31-5000* | Used oil | No discharge. Store onboard in waste oil tank; transfer to an approved onshore disposal site. | |
| Not covered under AKG-31-5000 | Trash & debris during exploration | No discharge. Separate by type, store in labeled containers and transport to shore for recycle and/or dispose in approved landfill. | |

Figure 1: Kitchen Lights Unit Vicinity Map

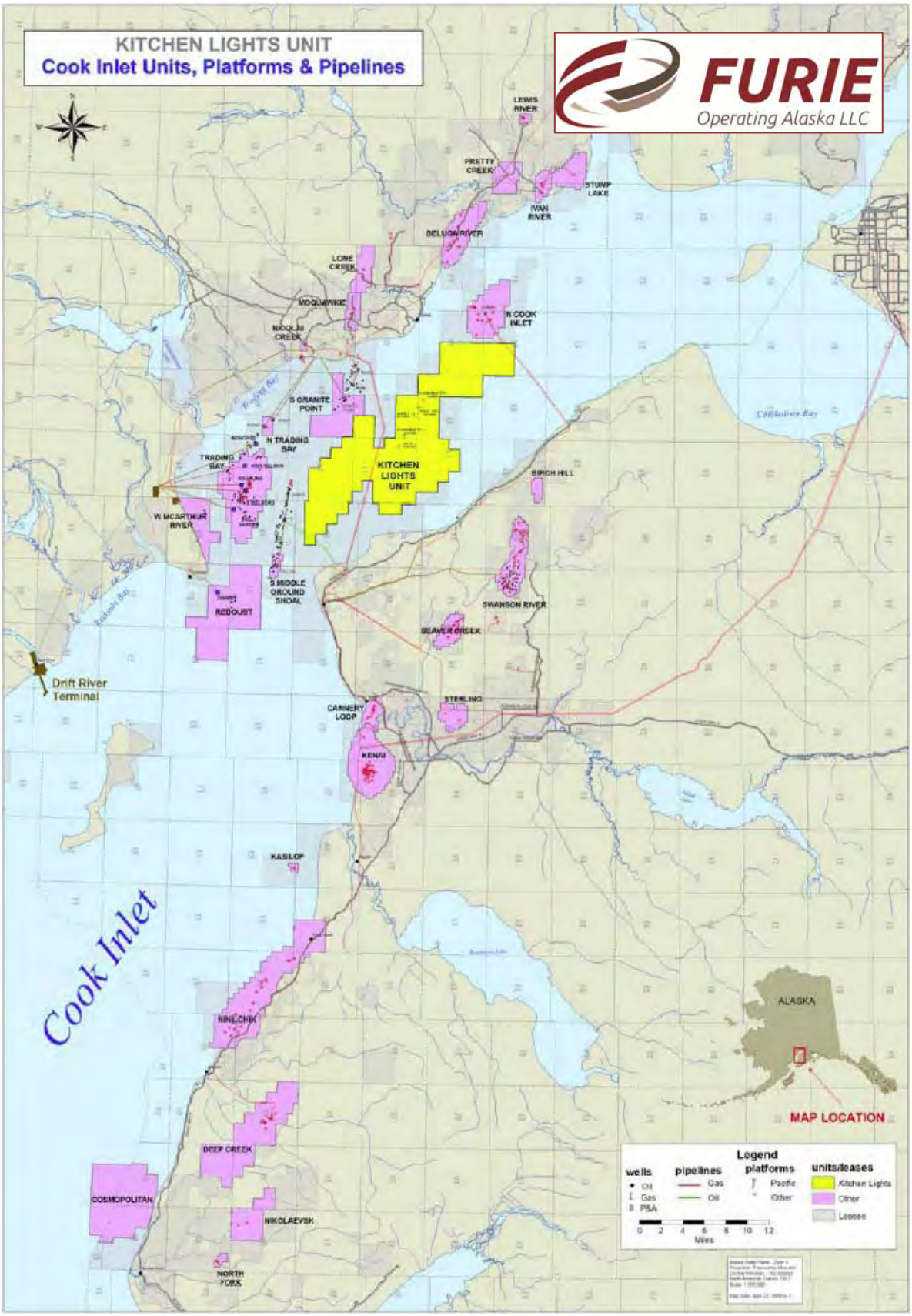


Figure 2: Kitchen Lights Unit Well locations

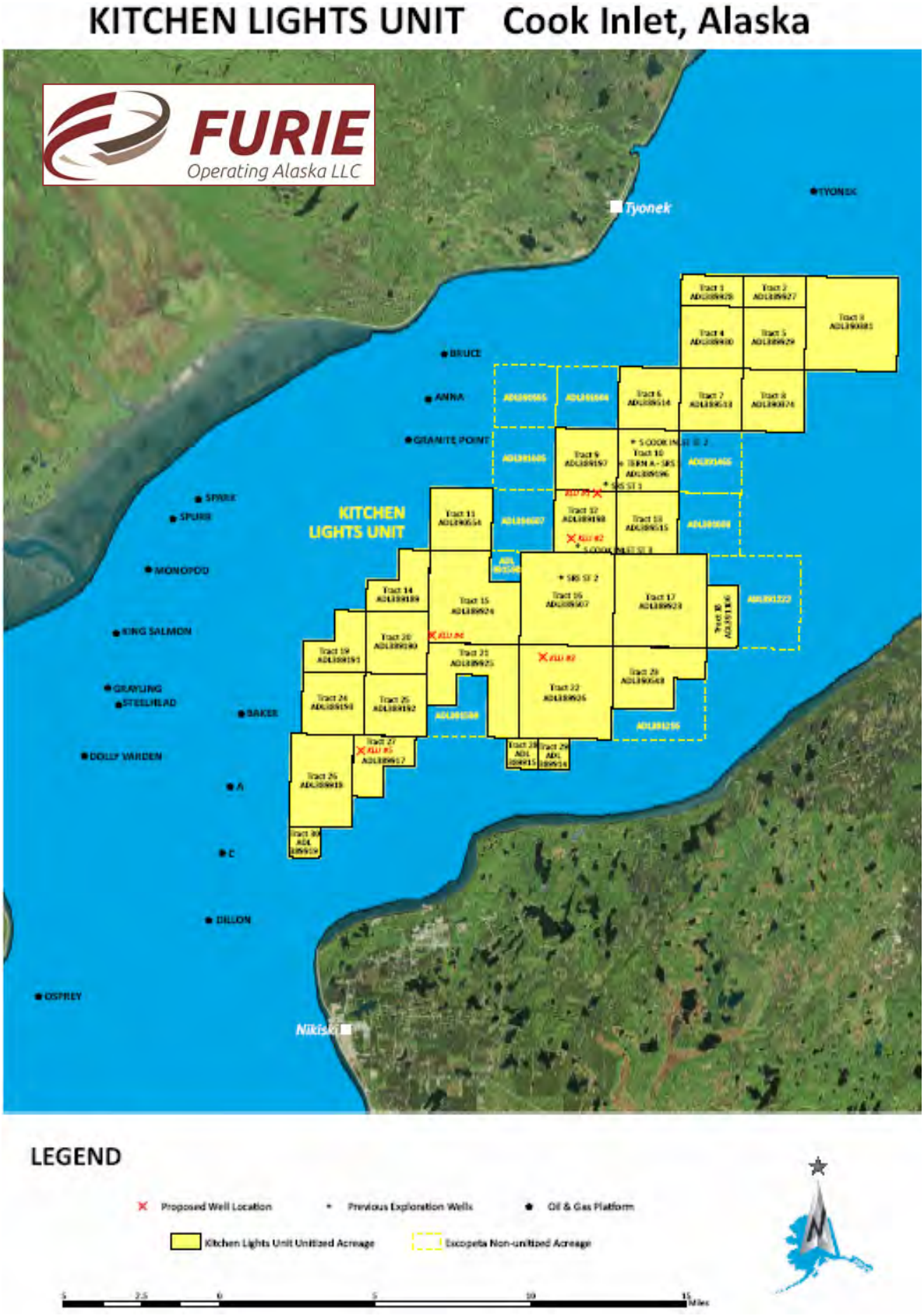
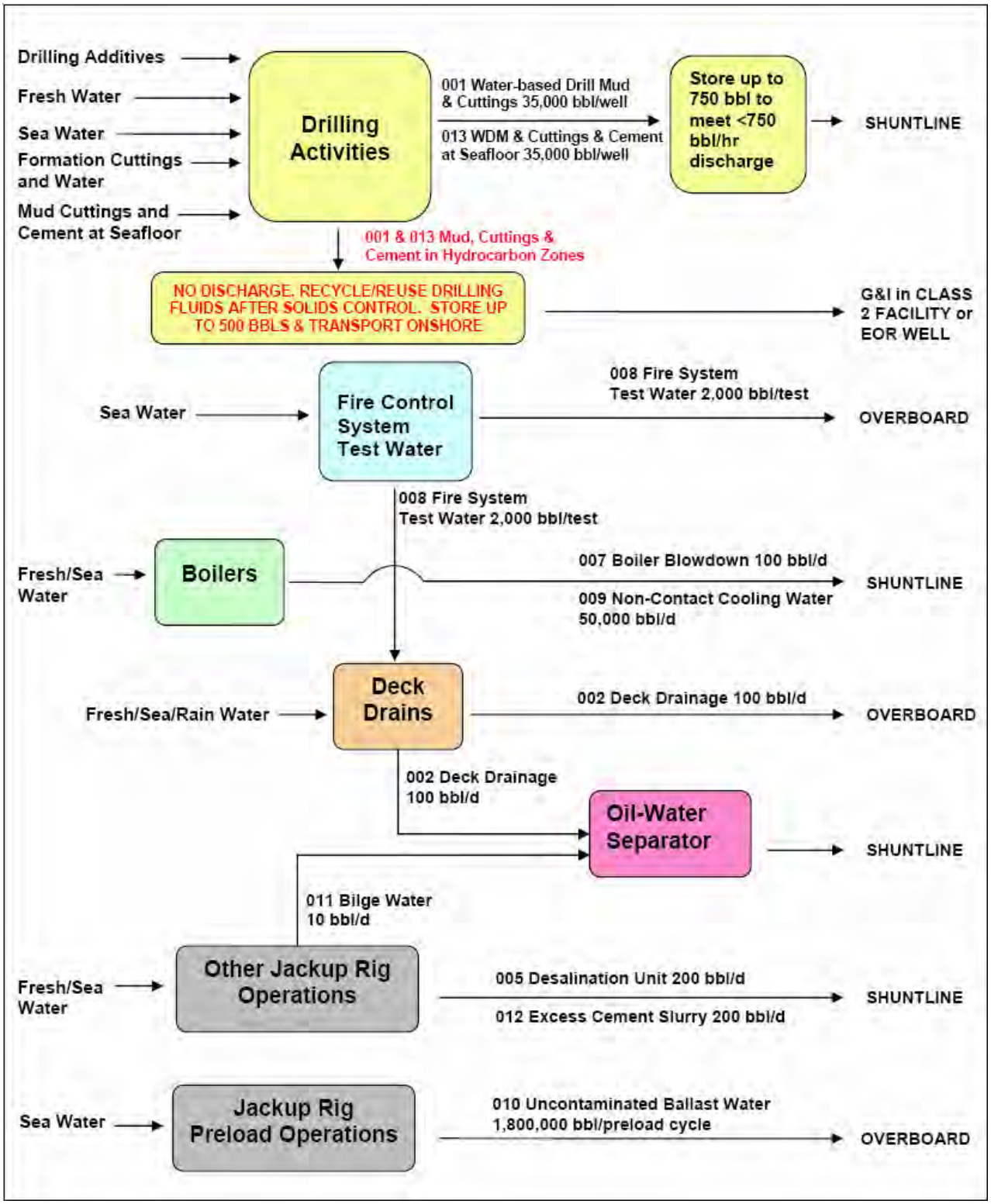


Figure 3: Spartan 151 Discharge Process Flow Diagram



# TAB

## Attachment 1
## EXPLORATION PLAN

# Exploration Plan
## NPDES General Permit AKG-31-5022

2011 – 2016 EXPLORATION DRILLING PLAN

FURIE OPERATING ALASKA, LLC
KITCHEN LIGHTS UNIT

Kitchen Lights Unit #1
Kitchen Lights Unit #2
Kitchen Lights Unit #3
Kitchen Lights Unit #4
Kitchen Lights Unit #5

NORTH COOK INLET, ALASKA


Operator:

FURIE
Operating Alaska LLC

Furie Operating Alaska, LLC
1029 W. 3rd Avenue, Suite 500
Anchorage, AK 99501

**December 30, 2011**

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## PLAN OF EXPLORATION



## List of Figures



## List of Tables



## Appendices

## Glossary of Acronyms

| | |
|---|---|
| AD | Annular Diverter |
| ADEC | Alaska Department of Environmental Conservation |
| ADL | Alaska Division of Land |
| AOGCC | Alaska Oil and Gas Conservation Commission |
| APD | Application for Permit to Drill |
| API | Alaska Petroleum Institute |
| ASP | Alaska State Plane |
| BBLS/DAY | Barrels per Day |
| BMP | Best Management Practices |
| BML | Below Mud Line |
| BOP | Blow Out Preventer |
| BOPE | Blow Out Preventer Equipment |
| BTC | Below Top Casing |
| CISPRI | Cook Inlet Spill Prevention and Response, Inc. |
| EMP | Environmental Monitoring Plan |
| EPA | Environmental Protection Agency |
| Furie | Furie Operating Alaska, LLC |
| HSE | Health Safety and Environment |
| MML | Mean Lower Low Water |
| NOI | Notice of Intent |
| NPDES | *National Pollutant Discharge Elimination System* |
| OD | Outside Diameter |
| ODPCP | Oil Discharge Prevention and Contingency Plan |
| RCRA | Resource Conservation and Recovery Act |
| RP | Recommended Practice |
| UIC | Underground Injection Control |
| USCG | United States Coast Guard |
| VHF | Very High Frequency |
| VSP | Vertical Seismic Profile |

# Section 1: Introduction

Furie Operating Alaska, LLC is providing a notice of intent (NOI) for continued coverage under The National Pollutant Discharge Elimination System (NPDES) General Permit AKG-31-5000 (AKG-31-5022) for oil and gas exploration drilling in state of Alaska coastal waters of the upper Cook Inlet. The purpose of the permit application will be to allow Furie authorized discharges during drilling activities in coastal waters, starting May 2011 (estimated drilling date 6/15/2011).

Drilling will be conducted by Spartan 151 jackup drill rig (Baker Marine Class 150 HC or smaller class) during ice-free months. Furie's initial plans for drilling activities in coastal waters include a multi-year, five well exploration program. Depending on results, additional wells may be drilled.

AKG-31-5000/5022 allowed for discharges from new oil and gas extraction facilities engaged in exploration activities under the Offshore and Coastal Subcategories of the Oil and Gas Extraction Point Source Category (40 CFR Part 435, Subparts A and D).

Furie provides this Plan of Exploration to the U.S Environmental Protection Agency (EPA) as an attachment to its NOI for continued use of the NPDES General Permit AKG-31-5022, pursuant to *40 CFR Part 435, Subparts A and D.*

The five well exploratory drilling program will be conducted at Furie's proposed locations on State of Alaska Oil and Gas Leases ADL 389198, ADL 389924, ADL 389926, and ADL 389917.

The program had begun with pre-drilling environmental monitoring and geohazard surveys in the summer of 2011. Actual drilling begun after the Spartan 151 arrived in the upper Cook Inlet during August of 2011. Furie will be the operator of the exploration project and permittee of record.

**Reviewer's Note:**

**Furie Operating Alaska, LLC was formerly known as Escopeta Oil Company, LLC ("EOC"). Throughout this Plan, the use of "Escopeta Oil Company, LLC" or "EOC" is synonomous with "Furie Operating Alaska, LLC" and "Furie".**

# Section 2: Description of Proposed Activities

## 2.1 Exploration Well Locations

Furie, as operator of the Kitchen Lights Unit, plans to drill 5 exploration wells in the marine waters of the upper Cook Inlet. The Furie proposed well locations are all offshore, generally located between the Village of Tyonek and the East Forelands, as detailed below:

- **Kitchen Lights Unit #1 is 9 miles S of Tyonek Village, and 30 miles N of Kenai**
- **Kitchen Lights Unit #2 is 11 miles S of Tyonek Village, and 28 miles N of Kenai**
- **Kitchen Lights Unit #3 is 14 miles S of Tyonek Village, and 26 miles N of Kenai**
- **Kitchen Lights Unit #4 is 15 miles S of Tyonek Village, and 25 miles N of Kenai**
- **Kitchen Lights Unit #5 is 19 miles S of Tyonek Village, and 20 miles N of Kenai**

The Furie vicinity and well location maps are illustrated in Figures 1 and 2 of the NOI Sheet. The proposed well location information is detailed below:

**Table 1: KITCHEN LIGHTS UNIT - WELL LOCATIONS**

| WELL NAME | LEASE | DMS (N) | DMS (W) | State Plane (X) | State Plane (Y) | TRM | Sec. |
|---|---|---|---|---|---|---|---|
| KLU #1 | ADL 389198 | 60° 56' 05.183" | 151° 09' 01.334" | 295390.008284 | 2535399.998050 | T10N, R11W., SM | 25 |
| KLU #2 | ADL 389198 | 60° 54' 48.071" | 151° 10' 27.991" | 290968.601578 | 2527646.764540 | T10N, R11W., SM | 35 |
| KLU #3 | ADL 389926 | 60° 51' 29.250" | 151° 11' 58.000" | 286149.664698 | 2507541.296080 | T09N, R11W., SM | 22 |
| KLU #4 | ADL 389924 | 60° 52' 02.450" | 151° 18' 19.790" | 267310.136295 | 2511273.000830 | T09N, R11W., SM | 18 |
| KLU #5 | ADL 389917 | 60° 48' 46.810" | 151° 22' 14.870" | 255257.245550 | 2491648.220810 | T08N, R12W., SM | 03 |

Notes:

1) Datum for ALL coordinates is North American Datum 1927.

2) DMS = Degrees Minutes Seconds.

3) State Plane 4 = Alaska State Plane Zone 4, US Feet.

4) Kitchen Lights Unit #1 was originally known as Corsair #1

5) Kitchen Lights Unit #3 was originally known as East Kitchen #1

6) Kitchen Lights Unit #4 was originally known as Kitchen #1

7) Kitchen Lights Unit #5 was originally known as Kitchen #2

## 2.2 Drilling Schedule

The Spartan 151 jackup drill rig arrived in upper Cook Inlet waters in August 2011. This was after the necessary permits and approvals were secured, site clearances were approved, and initial environmental monitoring/sediment sampling was concluded.

Furie proposes to continue operating the Spartan 151 during open-water drilling months over the next five drilling seasons. At the end of the first drilling season, the jackup rig was moved to an approved anchorage (Port Graham) in south Cook Inlet waters for winter storage in warm stack mode. In future winter months, it may be used by other operators for their exploration.

Including environmental monitoring and geohazard pre-surveys, Furie drilling operations are expected to take place over a period of about the next five years. The proposed project schedule, subject to change, is as follows; however, Furie desires the ability to drill any of the five wells during any of the five drilling seasons, depending on various circumstances**.**

**2010 - 2011 (completed)**

- Complete initial environmental monitoring presurveys for all proposed wells, and detailed site clearance and pre-drilling geohazard surveys for the exploratory well locations. (KLU #1, KLU #2, KLU #3, KLU #4, KLU #5)

**2011 - 2012**

- Spartan 151 arrived in upper Cook Inlet in late August 2011 to drill and test the Sterling, Beluga, Tyonek Hemlock and Jurassic formations, approximately 16,500' depth.
- Rig up and drill KLU #1 from August 12 through November 15, 2011 to a depth of 8,805'.
- Conduct environmental monitoring survey during drilling of KLU #1.
- Rig down and move to winter storage, warm-stack rig until March 2012.
- Rig up and complete drilling and evaluating KLU #1 from approximately April 15 through July 1, 2012 to a depth of 16,500' +/-.
- Conduct environmental monitoring survey during drilling of KLU #1.
- Rig down and move to KLU #2 (or other) location.
- Rig up and drill KLU #2 from July 10 through November 15, 2011 (depth to be determined).
- Conduct environmental monitoring survey during drilling of KLU #2.
- Rig down and move to winter storage, warm-stack rig until March 2012.

**Subsequent Years**

- Move Spartan 151 from lower Cook Inlet in April to new well sites.
- Rig up and drill/complete/test wells from April 15 through November 15, each year.
- Conduct environmental monitoring survey during drilling and then conduct post environmental survey for each well during same survey.
- Rig down and release the Spartan 151 after completing wells.
- Conduct post environmental monitoring surveys at each well location during summer of each following year.

# Section 3: Drill Rig

Furie proposes to conduct its exploratory drilling activity using a Jackup rig, the Spartan 151.

The 151 is an independent leg, cantilevered jack-up drill rig of the Baker Marine Corporation 150 HC design that is capable of drilling to 25,000 feet in water depths from 12 to 150 feet. The rig is owned and operated by Spartan Offshore, Inc. and will be under EOC supervision.

Rig specifications are presented in Appendix A, and rig drawings are presented in Figure 1.

## 3.1 Rig Moves and Siting

Drilling began in August 2011. EOC (now known as Furie) mobilized the Spartan 151 in March 2011 by heavy lift vessel from the Gulf of Mexico. The Spartan 151 arrived in the lower Cook Inlet in mid August 2011. The rig was unloaded from the heavy lift vessel in Nanaimo, British Columbia, Canada. The rig was be met by tugs (i.e., size and class to be approved by USCG) and towed to Alaska for drilling in the upper Cook Inlet.

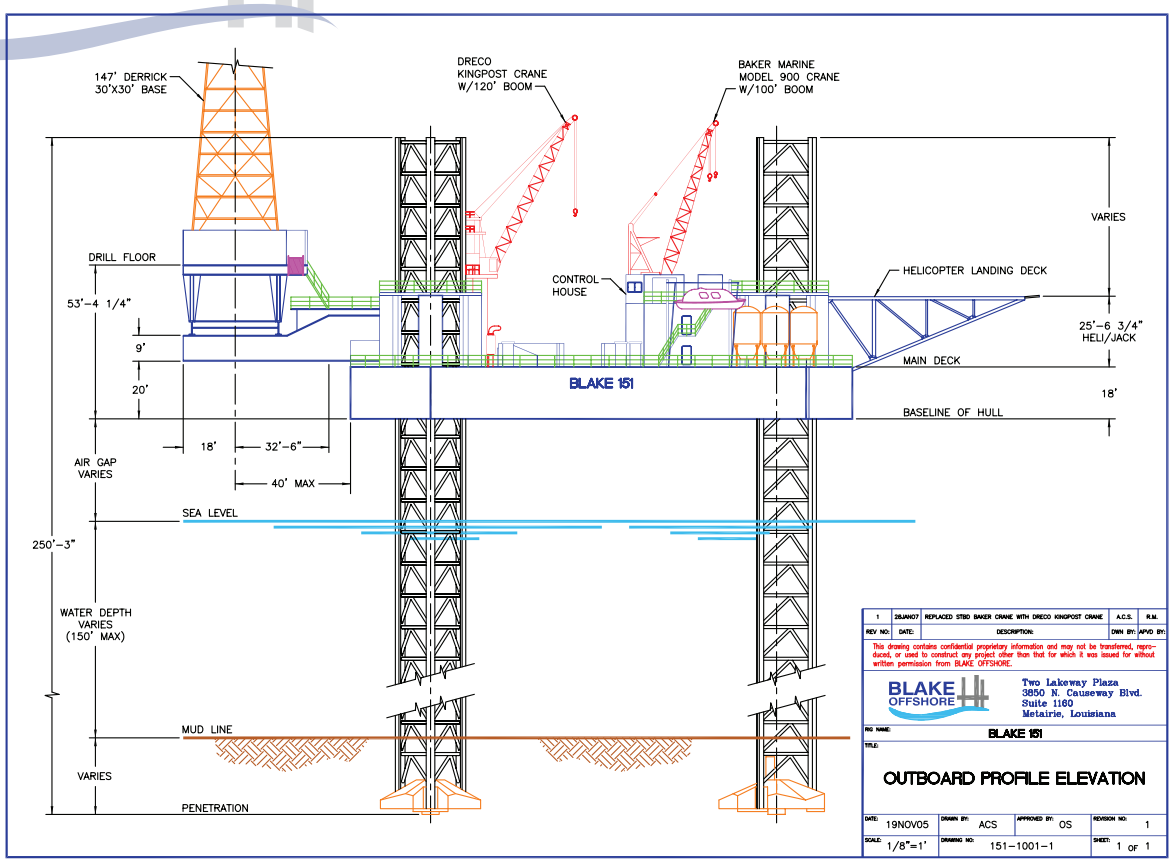
The rig will then be towed between drilling locations by ocean-going tugs under contract to Furie. All tow vessels will be USCG certified. All move plans will receive close scrutiny from the rig owner's tow master as well as the owner's insurers. All rig moves will be conducted in a manner to minimize any potential risk regarding safety as well as cultural or environmental impact.

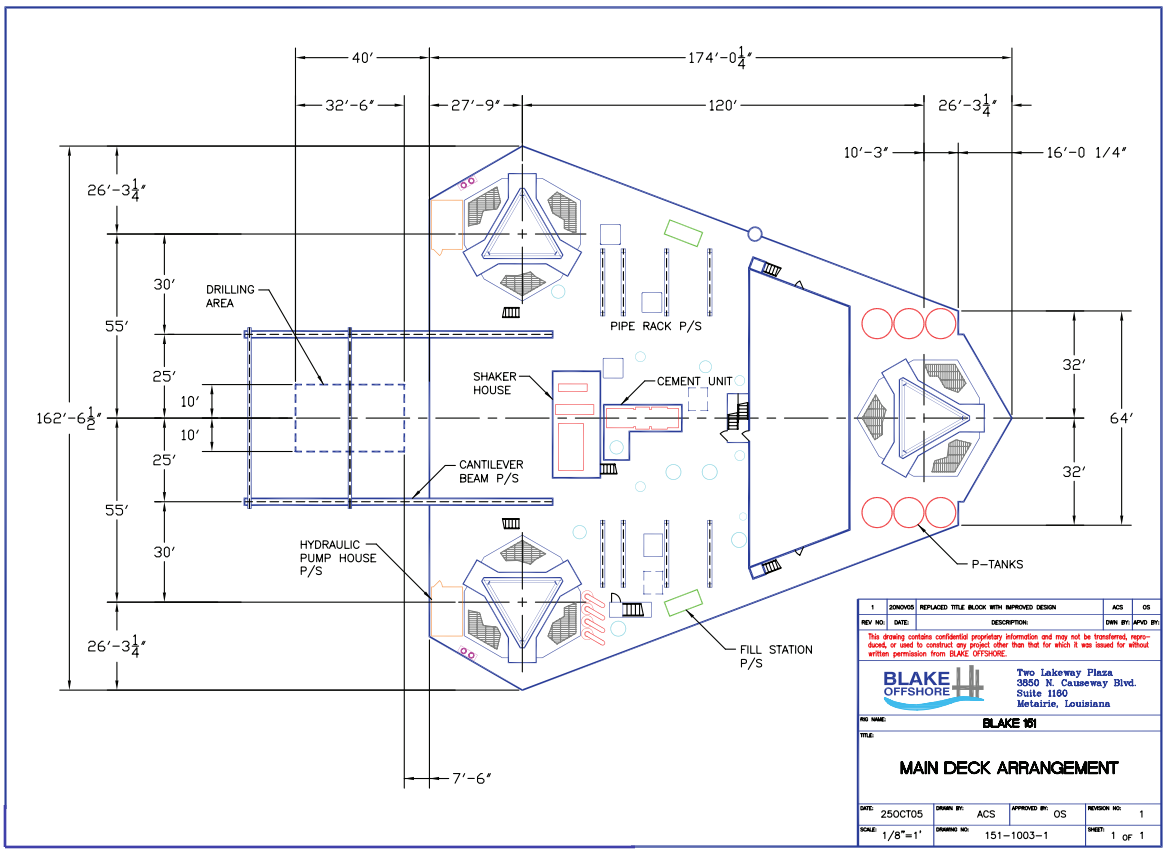
While under tow, the rig operations will be monitored by Furie and the drilling contractor management, both aboard the rig and onshore. VHF, satellite, and cellular phone communication systems will be available while the rig is under tow. Helicopter transport will also be available.

An inspection dive will be made immediately following set-down and final placement of the rig at the proposed well locations. Measurements made on this dive will serve as a reference from which assessments of possible scour can be made on subsequent dives. The Spartan 151 spud cans will be sandbagged if sea bed scouring is a problem.

## 3.2 Rig Support and Supply

The drilling rig will be stocked with most drilling supplies required to complete a one-year program. Deliveries of fuel and remaining items will be performed by support vessels and helicopters.




Spartan 151 Jack-up Drilling Rig Figure 1

# Section 4: Drilling Location Site Clearance

Prior to the arrival and set-down of the rig, a shallow hazards study will be conducted on and around the proposed drilling location. Geophysical and geotechnical data will be acquired and analyzed to evaluate the proposed site for potentially hazardous conditions at and below the sea floor, which could affect the safety of offshore exploration operations. Follow-up shallow hazard surveys will be conducted to document the condition of the sea floor after the rig is moved from the location.

Based on previous surveys conducted in this area of the upper Cook Inlet, the seafloor soils should be predominantly dense, overlaying compacted glacial materials. In some cases, soils are absent with bedrock outcrops on the sea floor. In addition, boulders (erratics) are present on the seafloor in some areas of the upper Cook Inlet.

A detailed site location/geohazard survey will be conducted at each proposed well location before drilling as required by the Alaska Oil & Gas Conservation Commission (AOGCC). A follow-up survey also will be conducted after each well is completed and the rig is moved to the next location. The follow-up survey will document the condition of the seafloor and the completed well site.

The intent of the survey program is to obtain detailed ocean floor and subsurface information by means of:

- Side scan sonar;
- Precision bathymetry;
- Sub-bottom profiling;
- Bubble pulse/Geopulse seismic survey;
- High-resolution seismic survey;
- Magnetometer; and
- Tide/Current survey.

These investigations provide for the ability to identify any potential seafloor hazards, man-made hazards, and/or subsurface geologic hazards. The survey also provides specific tide and current data for the planned rig geographic orientation.

Table 2 summarizes geohazard survey activities to be performed before and after drilling. Survey grids for the shallow hazard survey before and after drilling will be developed for the appropriate contractor(s).

| Table 2: Summary of Geohazard Survey Activities | | |
|---|---|---|
| **Activity** | **Before Drilling** | **After Drilling** |
| **Survey Grid:**<br>A 2400-meter survey grid at each well-site will consist of the following:<br>• 150 by 300 meter grid-spacing or closer within 600 meters (or farther) from the proposed wellhead;<br>• 300 by 600 meter grid-spacing extending to a distance of 1200 meters from the proposed wellhead; and<br>• 1200 by 1200 meter grid spacing extending another 1200 meters beyond that limit.<br>The acquisition of the data within the grid will be controlled by the use of differential GPS (1-meter accuracy) for location of the planned data sets. In water depths less than approximately 15 meters, grid-spacing for side-scan sonar survey lines may have to be closer than 150 meters apart due to reflection-geometry constraints on reliable far range horizontal resolution. | Yes | Yes |
| **Sea Floor Imagery:**<br>Side-scan sonograph mosaics of the sea floor will be used to identify areas of exposed rock outcrops, sea floor scarps, sedimentary textures, underwater obstacles, areas of potential biological activity, or archaeological resources. | Yes | Yes |
| **Bathymetry:**<br>Fathometer data will consist of high frequency (12 kHz or higher) continuous sea floor profiles, along with a system capable of detecting gas in the water column. | Yes | No |
| **Sub-Bottom Profiler:**<br>A 3 kHz (or similar frequency) sub-bottom acoustic profiler operating in pinger or "chirp" mode will be acquired to provide a continuous and high resolution image of the section immediately below mudline. The depth of penetration ideally will exceed the expected depth of penetration of the legs for a jackup rig. | Yes | No |
| **Bubble Pulse/Geopulse:**<br>The bubble pulse/geopulse system is specifically designed to be a mid-range investigation of depths between the sub-bottom profiler and high resolution seismic. The system is used to investigate sedimentary layers to an approximate depth of 100+ feet (depending on sediments) with an approximate resolution of five feet. The system consists of a bubble pulse source (resonant frequencies of 250-1100Hz), a geopulse source (750-3000Hz), a single channel seismic streamer, and a graphic or digital recorder. | Yes | No |
| **High-Resolution Seismic Profiling System:**<br>Acoustic reflection profiling will resolve geologic features over the survey area from the sea floor surface to a minimum depth beneath the sea floor of 1.0 to 1.5 seconds two-way travel time (800 to 1000 meters depending on sound velocity), depending on specific geologic conditions or drilling proposals (i.e., depth of casing point for conductor casing). The seismic data will be acquired using a multi-channel high resolution system, and all geophysical systems will be integrated with survey navigation resulting in accurate posting of fixed points on seismic lines. The recording system will have a 128 dB dynamic range. The seismic source will consist of a single airgun (100 cu. inch) with a frequency range of 20-30 Hz. The amplitude of the airgun at the source is approximately 226 dB, and 164 dB at slightly less than 1 km away (dB reference pressure is 1 µPa at 1 meter). | Yes | No |
| **Magnetometer Survey:**<br>Magnetometer data will be acquired to detect any ferrous (likely man made) material lying on or buried immediately under the seafloor. In particular, it is intended to determine the position of cables, pipelines or debris. | Yes | Yes |
| **Tide/Current Survey:**<br>Initially, a literature search will be performed to ascertain the tidal fluctuations and current velocities within the general area of the proposed well location followed by a more focused search for tidal and current information within the nearby vicinity of the proposed well location. Resources for the general and more focused literature searches are the various libraries within the State of Alaska and the geohazard survey reports (public records at AOGCC) for wells previously drilled in the nearby vicinity of the proposed well location. A tidal and current survey will acquire the data, using industry standard instrumentation andmethods, which is required for an environmental monitoring survey at each well. | Yes | Yes |

# Section 5: Well Operations

## 5.1 Drilling Operations

The drilling programs for the wells are described in detail in the Application for Permit to Drill (APD), filed with the AOGCC. In the APD, the drilling mud program, casing design, formation evaluation program, cementing programs and other engineering information are presented. Much of this information is of proprietary nature. The following sections summarize the drilling program within the limits of public information.

## 5.2 Geologic Valuation

Throughout the drilling operations, mud logging samples and cuttings will be obtained and the circulated drilling fluid will be monitored. Analysis of the cuttings and drilling mud provides specific geologic information as well as "real time" information concerning the subsurface pressures and contents (oil, water, gas) of the strata penetrated. A detailed summary of the lithology and mud, known as the "mud log" will be prepared. The mud log forms a major part of the well records that are submitted to the AOGCC.

Electric wireline logging operations will be performed in addition to the continuous monitoring provided by the mud loggers. These logs record information regarding formation strata in the wellbore through electric, sonic and nuclear stimulation. Actual samples of the strata may be obtained using sidewall coring tools. Formation fluid samples can be obtained using formation tester tools. The type and number of logs run will be determined based on drilling information. Copies of all logs are submitted to the AOGCC as part of the well record.

## 5.3 Casing and Cementing

The casing and cementing programs for the wells will be consistent with sound oilfield practice and is in accord with the rules of the AOGCC. Table 3 presents a possible well casing program, including the drill depth and circumference dimensions. Actual casing design is subject to change.

All casings will be cemented as required by the AOGCC rules. These rules specify that conductor and surface casings will be cemented from total depth to surface. For the deeper casing strings, sufficient cement is required to cover any hydrocarbon bearing zones with a minimum of 500 linear feet excess. The rules specify that if the structural casing is driven, no cement is required.

## 5.4 Flow Testing

If a decision is made to flow test the well, a testing program will be written at that time based on the known downhole conditions. Prospective test intervals will be produced through perforations in the casing and produced fluids will be brought to the surface via a tubing string. Reservoir fluids will be processed through separation equipment on board the rig. Separated liquids both oil and water, will be stored in produced fluid tanks on a support vessel. Separated gas will be flared on testing vessels that support the rig. An air quality permit from the Alaska Department of Environmental Conservation (ADEC) is under review and preliminary approval.

| Table 3: Casing Program Design and Drilling Summary (example) | | | |
|---|---|---|---|
| **Hole Diameter** | **Casing Program (Type & O.D.)** | **Total Vertical Depth (BML)** | **Notes** |
| 30” (Driven) | **Conductor: 30”** | 400 ft. | **No discharge related to driven structural casing** |
| 26” | **Diverter String: 20"** | 1,600 ft | **Conductor/Diverter String/Surface Interval drilled with pre-hydrated gel/seawater “spud mud” (water-based drill fluid).**<br>**Estimated volumes:**<br>• Drill fluids (NPDES Discharge Type 001): 5,850 bbls<br>• Drill cuttings (NPDES Discharge Type 001):12,000 bbls<br>**Disposal:** Discharge via shuntline |
| 17-1/2” | **Surface: 13-3/8”** | 4,800 ft | **Surface Interval drilled with pre-hydrated gel/seawater “spud mud” (water-based drill fluid).**<br>**Estimated volumes:**<br>• Drill fluids (NPDES Discharge Type 001): 8,520 bbls<br>• Drill cuttings (NPDES Discharge Type 001): 6,810 bbls<br>**Disposal:** Discharge via shuntline |
| 12-1/4” | **Intermediate: 9-5/8”** | 13,000 ft. | **Intermediate Interval drilled with pre-hydrated gel/seawater water-based drill fluid.**<br>**Estimated volumes:**<br>• Drill fluids (NPDES Discharge Type 001): 18,480 bbls<br>• Drill cuttings (NPDES Discharge Type 001): 8,750 bbls<br>**Disposal:** Discharge via shuntline |
| 8-1/2” | **Liner: 7”**<br>– – – – – – | 16,500 ft | **Liner (12,700 ft to 16,500 ft) drilled with pre-hydrated gel/fresh water water-based drill fluid IF COAL STABILITY PROBLEMS ARE NOT ENCOUNTERED.**<br>**Estimated volumes:**<br>• Drill fluids (NPDES Discharge Type 001): 2,100 bbls<br>• Drill cuttings (NPDES Discharge Type 001): 950 bbls<br>**Disposal:** Discharge via shuntline<br>16,116' Top of Mid-Jurassic (Pre-Tertiary) |

In the event of a significant discovery, longer evaluation of any potentially productive intervals may be required, and a transfer barge may be employed to allow removal of produced fluids from the rig. Such a system was successfully employed during ARCO's North Foreland State #1 exploration well. Offload and transport of produced fluids is desirable since the available storage on board the rig is limited and it is not possible to burn liquid hydrocarbons. Language will be included in the Oil Discharge Prevention and Contingency Plan (ODPCP) to incorporate produced fluids marine transfer operations under the coverage of the plan. ADEC gave approval to a modification of the ODPCP for the North Foreland State #1 well to incorporate marine transfer operations of produced fluids under the Plan. Furie Operating will seek ADEC approval for a produced fluids marine transfer operation for the drilling program. This operation may include deploying Cook Inlet Spill Response, Inc., (CISPRI) response vessels during transfer.

The offloading operations are permitted through the ADEC and the USCG. During drilling of the North Foreland well, produced fluids were offloaded from the rig a total of 10 times. The barge delivered that cargo to Kenai Pipeline at Nikiski. In general, the procedures are similar to those employed during rig fuel transfers.

## 5.5 Blowout Prevention Program and Equipment

All operating procedures on the rig, whether automated or controlled by company or contractor personnel, are specifically designed to prevent a loss of well control. The primary method of well control utilizes the hydrostatic pressure exerted by a column of drilling mud of sufficient density to prevent an undesired flow of formation fluid into the well bore. In the unlikely event that primary control is lost, surface blowout prevention equipment (BOPE) would be used for secondary control

Primary well control will be maintained by over-balancing formation pressures with drilling fluid. Automatic and manual monitoring equipment will be installed to detect any abnormal variations in the mud system and drilling parameters. A mud-logging unit, manned by experienced personnel, will be in continuous use throughout the drilling operations and will monitor formation pressure, hydrocarbon show and loss or gain in mud pits.

In the event the well attempts to flow, the blowout preventers would be activated to shut in the well. The casing program is designed to allow the well to be shut in at the surface. Kick tolerance will be determined before drilling to the casing point on each hole section. Leakoff tests or formation competency tests will be made after running each string of casing beginning with the surface string. These tests are both for well control information and as an indicator or the depth at which the next string of casing will be required.

### BOPE and Diverter System

BOPE stack, diverter and choke/kill manifold system equipment is detailed in Appendix A.

### BOP Testing

All blowout prevention equipment and testing procedures will meet API Recommended Practice (RP) No. 53 and AOGCC regulations. All blowout prevention equipment tests will be conducted with a non-freezing fluid when the ambient temperature around the BOP stack is below 32$^{o}$F. Tests of all blowout prevention equipment will be conducted at least bi-weekly and

before drilling out the shoe of each casing string. Function tests and crew drills will be conducted daily.

## 5.6 Well Plugging and Abandonment (P&A)

When all planned operations are completed, the wells most probably will be cemented and permanently abandoned (P&A) according to AOGCC regulations. This includes cutting the casing below the sea floor and retrieving the stub. Each string is also sealed with cement and mechanical plugging devices to prevent the movement of any reservoir fluids between various strata. A P&A procedure will be presented to the AOGCC for their approval prior to beginning the operation. The AOGCC usually has a portion of the P&A witnessed and approved by one of their field inspectors.

# Section 6: Discharge and Waste Management

## 6.1 Discharge

The *National Pollutant Discharge Elimination System (NPDES) Oil and Gas Extraction Facilities in Federal and State Waters in Cook Inlet General Permit No. AKG-31-5000* authorizes discharges (outfalls) from new oil and gas exploration, development, and production facilities in upper Cook Inlet. This permit is regulated by the United States Environmental Protection Agency (EPA). With the exception of hydrocarbon-contaminated cuttings and mud, all drilling wastes will be discharged in Cook Inlet beneath the drill rig via shuntline, as stipulated in the NPDES general permit or disposed onshore until the permit is approved. Cuttings contaminated with hydrocarbons will be transported to an approved onshore disposal site. See Table 4 below for an outline of the waste management plan.

Discharges of drilling fluids from the five Furie wells will include only those generic, water-based drill muds and additives along with mud-coated rock formation cuttings described and authorized in the NPDES General Permit and pre-approved by EPA for offshore disposal. Desired mud properties will be maintained under the direction of the on-site drilling foremen and qualified mud engineers. Quantities of basic mud materials maintained on the drilling vessel will be patterned after previous Cook Inlet offshore experience as dictated by good oilfield practice.

Per *AKG-31-5000*, Furie has developed and will follow a best management practice (BMP) plan regarding normal operations and ancillary activities designed to prevent or minimize the generation and potential for the release of pollutants from the facility to the waters of the United States. Furie's BMP plan (Attachment 4) will also ensure that a sufficient inventory of barite and lost circulation materials be maintained on the drilling vessel to minimize the possibility of a well upset and the likelihood of a release of pollutants to Cook Inlet waters. These materials can be re-supplied, if required, from the supply vessel. In consideration that adverse weather could prevent immediate re-supply, sufficient materials will be available on board to completely rebuild the total circulating volume.

Also, as stipulated in *AKG-31-5000*, Furie will also develop and conduct an environmental monitoring study and follow an Environmental Monitoring Plan (EMP). The objectives of the environmental monitoring will be to monitor for discharge-related impacts, determine statistically significant changes in sediment pollutant concentrations and sediment toxicity with time and distance from the discharge, and monitor for discharge related impacts to the benthic community. Monitoring will be conducted before drilling, during drilling mud disposal, and after drilling operations cease. The EMP is included as Attachment 3 to the NOI.

## 6.2 Subsurface Injection

An underground injection approval (annular injection) to dispose of muds, cuttings, and wastewater under AOGCC's Underground Injection Control (UIC) Program may also be obtained (AOGCC has primacy from EPA for regulation of Class II wells). Annular injection will also allow disposal of fluids that do not meet the discharge requirements. The most likely event that will not allow discharge to the Cook Inlet under an approved NPDES permit is if the mud becomes contaminated with hydrocarbons.

| Table 4: Discharge and Waste Management Plan | | | |
|---|---|---|---|
| **Discharge Type** | **Waste Composition** | **Est. Amt.** | **Storage/Disposal** |
| 001 Drilling | Water-based drill fluids | 35,000 bbls/well | Recycle/reuse drilling fluids after solids control. Store up to 750 bbls in upright storage tanks to ensure <750 bbls/hr discharge. Discharge via shuntline below inlet water surface. Free of hydrocarbons. |
| 001 Drilling Cuttings | Cuttings above hydrocarbon zones with water-based drill muds | 30,000 bbls/well | Store up to >2000 bbls onboard in mud pits, sand trap, and desilter and trip tanks. Discharge via shuntline below water surface. Free of hydrocarbons. |
| 002 Deck Drainage | Fresh water or seawater | 100 bbls/day | Discharge uncontaminated water overboard to surface. Treat water coming into contact with other fluids by processing oil-water separator prior to discharge by shuntline. Free of hydrocarbons. |
| 003 Sanitary Waste | Human waste | 100 bbls/day | Treat prior to discharge with MSD and dechlorination, shuntline below water surface. No solids or foam discharge. |
| 004 Domestic Waste | Gray water | 500 bbls/day | Treat prior to discharge with MSD and dechlorination, shuntline below water surface. No solids or foam discharge. |
| 005 Desalination Unit Waste | Rejected brine from water maker unit | 200 bbls/day | Discharge via shuntline below water surface. Free of hydrocarbons. |
| 006 Blowout Preventer Fluid | Fluids generated during blowout | 0 bbls/day | No discharge unless during well control emergency; discharge via diverter system over side of drill deck. Free of hydrocarbons. |
| 007 Boiler Blowdown | Fresh water discharge to control solids in boilers | 100 bbls/day | Discharge via shuntline below water surface. Free of hydrocarbons. |
| 008 Fire Control System Test Water | Treated seawater | 2,000 bbls/test | No regular discharge (only in case of fire, blowout or system test). Discharge overboard or discharge into deck drainage, treat by processing through oil-water separator and then discharge by shuntline. |
| 009 Non-contact Cooling Water | Treated seawater | 50,000 bbls/day | Discharge via shuntline below water surface. |
| 010 Uncontaminated Ballast Water | Cook Inlet seawater used for preload | 1.8 MM bbls/ preload cycle | Discharge transit water prior to entering Cook Inlet (see BMP Plan for details). Then discharge Cook Inlet seawater via shuntline below water surface. |
| 011 Bilge Water | Treated fresh water and seawater | 10 bbls/day | Treat prior to discharge shuntline below water surface |
| 012 Excess Cement Slurry | Excess cement | 200 bbls/day | Discharge via shuntline below water surface. Free of hydrocarbons. |
| 013 Muds, Cuttings, Cement at Seafloor | Muds and cuttings above hydrocarbon zones, extra cement | 35,000 bbls/well | Discharge via shuntline below water surface. Free of hydrocarbons. |
| 014 Waterflooding Discharges | Treated seawater | 500 bbls/day | Discharge via shuntline below water surface. Free of hydrocarbons. |
| 015 Produced Water & Produced Sand | Hydrotest water, fluids & solids | 200 bbls/day | Discharge via shuntline below water surface. Free of hydrocarbons. |
| 016 Completion Fluids | Solids-free liquids (typically brines) | 250 bbls/day | Discharge via shuntline below water surface. Free of hydrocarbons. |
| 017 Workover Fluids | Brines | 100 bbls/day | Discharge via shuntline below water surface. Free of hydrocarbons. |
| 018 Well Treatment Fluids | Fluids used to increase productivity from hydrocarbon zones | 100 bbls/day | Treat prior to discharge shuntline below water surface. Free of hydrocarbons. |
| 019 Test Fluids | Fluids sent downhole during testing | 500 bbls/day | Discharge via shuntline below water surface. Free of hydrocarbons. |
| Not allowed under *AKG-31-5000* | Cuttings in Hydrocarbon Zones | No discharge. Recycle/reuse drilling fluids after solids control. Store up to 500 bbls in upright storage tanks and transport for onshore by G&I in Class 2 injection well. | |
| Not allowed under *AKG-31-5000* | Used oil | No discharge. Store onboard in waste oil tank; transfer to an approved onshore disposal site. | |
| Not covered under AKG-31-5000 | Trash & debris during exploration | No discharge. Separate by type, store in labeled containers and transport to shore for recycle and/or dispose in approved landfill. | |

Although an annular injection permit may be obtained, it is at present unknown whether subsurface injection is possible at the exploration well until appropriate tests are successfully completed at the intended offshore locations. The ability to dispose of fluid downhole is dependent on the existence of suitable subsurface formations, the formation fluid content, proximity to any hydrocarbon bearing zones and the availability of an annulus between the casing strings set in the well.

## 6.3 Off-Site Disposal

All contractors working on the project will be encouraged to use waste minimization and recycling practices where applicable. Solid waste will be classified, segregated and labeled as general refuse, hazardous and Resource Conservation and Recovery Act (RCRA) exempt or non-exempt. It will then be stored in designated areas or appropriately labeled dumpsters. The on-site HSE Manager will handle waste management activities and be responsible for proper manifesting for transport and off-site disposal.

# TAB

## Attachment 1
## EXPLORATION PLAN

# Exploration Plan
## NPDES General Permit AKG-31-5022

2011 – 2016 EXPLORATION DRILLING PLAN

FURIE OPERATING ALASKA, LLC
KITCHEN LIGHTS UNIT

Kitchen Lights Unit #1
Kitchen Lights Unit #2
Kitchen Lights Unit #3
Kitchen Lights Unit #4
Kitchen Lights Unit #5

NORTH COOK INLET, ALASKA


Operator:

FURIE
Operating Alaska LLC

Furie Operating Alaska, LLC
1029 W. 3rd Avenue, Suite 500
Anchorage, AK 99501

**December 30, 2011**

SPARTAN

OFFSHORE DRILLING

SPARTAN 151

SPARTAN 202

SPARTAN 208

SPARTAN 303

MULTI-PURPOSE JACK-UPS

PLATFORM RIGS

# Rig Portfolio

# 151

SPARTAN OFFSHORE DRILLING

- **Refurbished to new in 2006**
- **Water depths from 12 to 150 ft.**
- **Drilling depth rating: 25,000'**
- **Three (3) drilling mud pumps**
- **2,000 HP drawworks**
- **Top drive, Varco TDS-3**
- **Quarters for 54 personnel**

**Drilling Vessel Description**
Designed and constructed by Baker Marine Corporation in 1981 (completely refurbished and upgraded in 2006), the 150' independent leg/cantilever unit was built in accordance with the rules of the American Bureau of Shipping and is classified as an A-1 self-elevating mobile drilling unit

**Type**
Baker Marine Corporation 150 H class independent leg cantilever jackup

**Class**
ABS + A1 self-elevating mobile drilling unit, 1980
Rules: USCG Requirement for Mobile Offshore Drilling Units

**Design Operating Conditions**
Maximum water depth (non-hurricane).....150'
Minimum water depth .....12'
Drilling depth..... 25,000'

**Maximum Operating/ Environmental Conditions**
**Normal drilling:**
Variable deck load ..... 3,313 Kips
Drilling load..... 1,000 Kips
Wind speed.....70 Knots
Wave height..... 35'

**Hurricane Survival**
Water depth .....130'
Variable load..... 2,313 Kips
Wind speed.....100 Knots
Wave height.....45'

**Drillfloor Loading**
Rotary beam load .....1,300,000 lbs
Setback.....500,000 lbs
Combined hook and setback..... 1,300,000 lbs

**Cantilever**
- Capable of extending 40' beyond hull's stern transom
- Drill floor, skids transversely 10' from center, port or starboard
- Entire cantilever and drill floor designed to skid off the hull to facilitate work on large platforms or remote well bays

**Legs**
Three (3) triangular Truss type, 250' - 3" long

**Rig Storage Capacities**
**Weight material and cement:**
Bulk mud..... 3,000 cu. ft
Bulk cement..... 3,000 cu. ft
Sack storage..... 5,000 sacks

**Rig Storage Capacities**
**Liquids:**
Drilling mud.....1,315 bbls.
Drill water.....3,373 bbls.
Diesel fuel.....1,543 bbls.
Potable water.....1,186 bbls.

**Elevating System**
Baker Marine electrohydraulic drive rack and pinion system

**Engine Generator Units**
- Four (4) Caterpillar D-398, radiator-cooled diesel engines, each driving an 800 kW, 600 volt, 60 Hz AC generator
- One (1) Caterpillar D-398, radiator-cooled engine driving an 800 kW, 600 volt AC generator – can be used as a standby or on main AC buss
- Two (2) Caterpillar D-399, radiator-cooled diesel engines, each driving a 1,050 kW, 600 volt AC generator to be used for the top drive and drawworks

**Electrical Distribution**
- Ross-Hill Model 1400 four (4) bay SCR distribution system for drilling and shipboard operations
- Gulf Coast two (2) bay SCR systems for powering the drawworks and top drive

**Drawworks**
- Mid-Continent U-1220 driven by two (2) GE 752 DC motors each rated at 1000 HP (intermittent)
- Two (2) catheads, 1-3/8 Lebus grooving, crown safety device, and Elmagco 7838 electric brake

**Derrick**
Branham 147' high x 30' base rated at 1,300,000 lbs static hook load; complete with adjustable air-powered casing stabbing board, derrick climbing assistor, racking platform

**Mud Pumps**
- Two (2) Gardner Denver PZ-10 triplex pumps, each pump is rated at 1,350 HP and driven by two (2) GE 752 DC motors complete with suction and discharge pulsation dampeners
- One (1) FB 1600 Triplex Pump; 1,600 HP, rated at 11,600 HP and driven by two (2) GE 752 DC motors complete with suction and discharge pulsation dampeners
- Note: Spartan Offshore will provide one (1) size liner for mud pumps. Operator to designate size prior to rig mobilization. The pumps shall be operated at a maximum of 85% of manufacturer's stroke and pressure rating when operating on a continuous basis.



*Spartan Offshore Drilling, LLC, 3850 N. Causeway Boulevard, Suite 1160 Metairie, Louisiana 70002 504.885.7449*

**Rotary** National C-375 with a 37.5" opening, independently driven by a GE 752 DC motor through a two-speed gear box complete with air brake

**Top Drive** Varco TDS-3 powered by a GE 752 traction motor hi-torque

**Ezy-Torque** Varco

**Shale Shaker** Two (2) Brandt King Cobras

**Desander/ Desilter/ Mud Cleaner** One (1) Brandt King Cobra mud cleaner unit with three (3) cone desanders and twenty-four (24) cone disilters

**Degasser** Brandt DG-5 (500 gpm)

**Quarters** 53-person air-conditioned quarters complete with galley, mess hall, recreation room, hospital room, bath facilities, change room, laundry and state rooms and office for rig manager and operator's representatives

**Heliport** 62' nominal diameter designed for Sikorsky S-61 loading

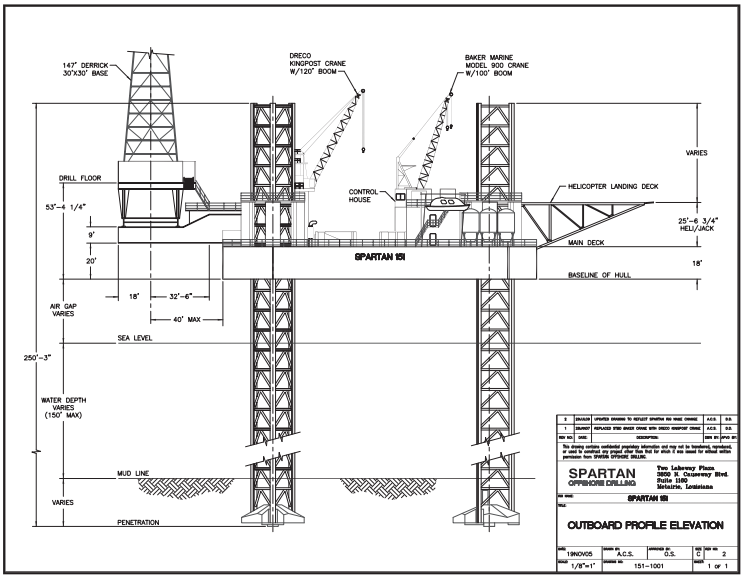
**Cranes**
- One (1) Baker Marine Model 900 crane with 100' boom rated at 49,965 lbs at a 20' radius and 41,055 lbs at a 40' radius
- One (1) Draco King Post crane to accommodate heavier loads; 80,000 lbs at 25'

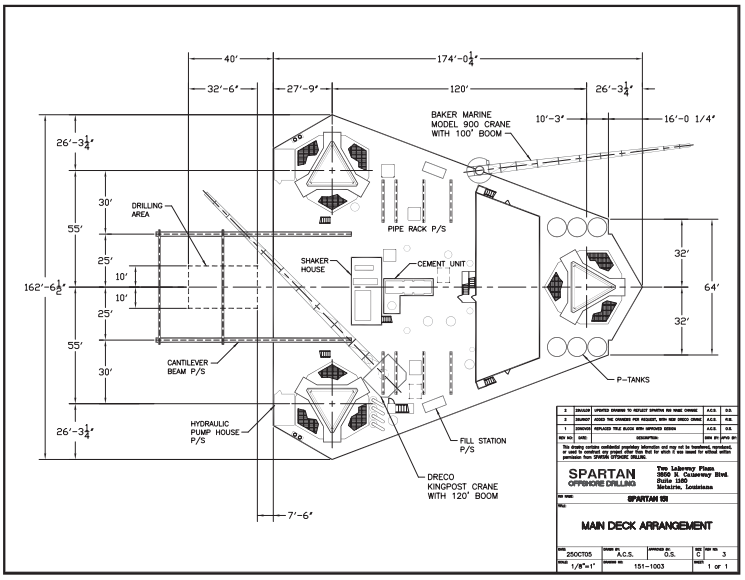
**Cementing Unit** BJ Unit is onboard; costs for the unit and associated equipment shall be for operator's account

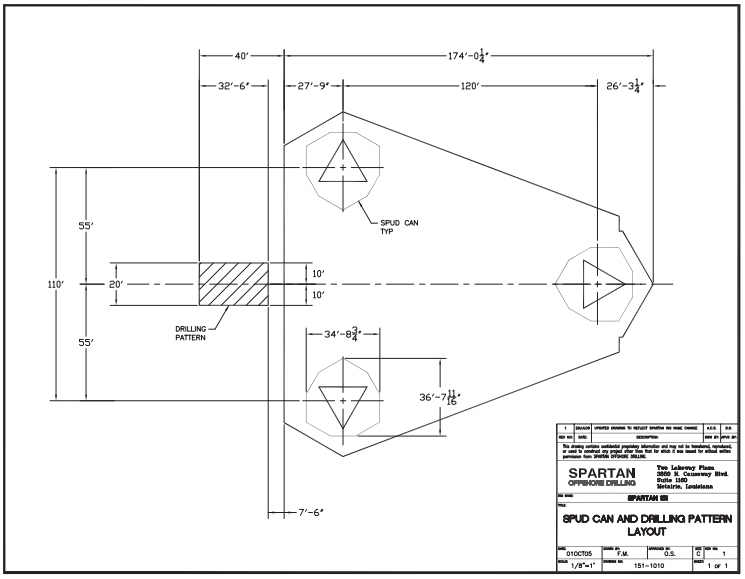
**Life Saving and Fire Protection**
- Two (2) 65-person life boats
- $CO_2$ fire extinguisher system or both engine room and emergency generator room
- All safety and fire protection equipment per USCG, ABS and MMS regulations

**BOP Equipment** (All have safety H2S)

| | |
|---|---|
| **Diverter** | 21-1/4" with hydro-control valves and overboard lines 2,000 psi (recharged per contract provisions) |
| **Annular** | 13-5/8" Hydril Type GK; 5,000 psi |
| **Single** | 13-5/8" Cameron Type U; 10,000 psi |
| **Double** | 13-5/8" Cameron Type U; 10,000 psi |
| **Gate Valves** | Two (2) 4-1/16" Cameron Type F; 10,000 psi |
| **Accumulator** | Koomy Type 80: 7 station, 22 bottle, 3,000 psi closing unit with two (2) air pumps, a triplex electric-driven pump |
| **Choke Manifold** | 3-1/16" 10,000 psi, with two (2) adjustable chokes and one (1) Swaco automatic choke |
| **Handling System** | Two (2) 25-ton pneumatic hoists with a BOP lift ring to install BOPs |
| **Choke & Kill Hoses** | One (1) each |
| **Note** | Contractor will provide the initial size rams for contractor supplied drill pipe and one (1) set of shear rams. All replacement BOP rubber goods shall be recharged per contract. |



# U. S. Department of Homeland Security
# United States Coast Guard
# Certificate of Approval

Coast Guard Approval Number: 159.015/7204/0 Expires: 30 January 2014

MARINE SANITATION DEVICE
CERTIFICATE OF TYPE TEST UNDER IMO RES. MEPC.2(VI)

SEVERN TRENT DENORA, LLC
1110 INDUSTRIAL BOULEVARD
SUGAR LAND TX 77478

Type II, Model Omnipure 8MS and 8MC, 6800 LPD capacity, for inspected vessels.

This is to certify that Omnipure 8MS and 8MC, having a designed hydraulic loading of 6.8 cu. m/day, an organic loading of 3.6 kg/day Biochemical Oxygen Demand (BOD) and of the design shown on Drawing 8MS-P-01 Rev. 1, 8MC-P-01 Rev. 1, and 6/8/12M-E-02 Rev. 2 has been examined and satisfactorily tested in accordance with the International Maritime Organization Resolution MEPC.2(VI) to meet the operational requirements referred to in Regulation 4(1)(.1) of ANNEX IV of the International Convention for the Prevention of Pollution from ships, 1973.

The tests were carried out on similar equipment having a designed hydraulic loading of 13.63 cu. m/day on board KEYES OFFSHORE RIG No. 250, and completed on January 14, 1983.

The equipment produced an effluent which did not exceed 250 fecal coliform per 100 ml/MPN, and a geometric mean of total Suspended Solids of 50 mg/l.

The control and sensor equipment were tested for shock and vibration. The geometric mean of 5 day BOD does not exceed 50 mg/l and the equipment can operate under conditions of heel of up to at least 15 degrees. A plate or durable label containing manufacturers name, type and serial number, hydraulic loading and manufacture date is to be fitted to the unit. A copy of this certificate shall be carried on board at all times. IMO Certificates of Type Approval do not expire and are valid for equipment manufactured at any time during the period of validity of this certificate.

This certificate documents compliance with 33 CFR 159.015.

*** END ***

THIS IS TO CERTIFY THAT the above named manufacturer has submitted to the undersigned satisfactory evidence that the item specified herein complies with the applicable laws and regulations as outlined on the reverse side of this Certificate, and approval is hereby given. This approval shall be in effect until the expiration date hereon unless sooner canceled or suspended by proper authority.

GIVEN UNDER MY HAND THIS 30th DAY OF JANUARY 2009, AT WASHINGTON D.C.

T. E. MEYERS
Chief, Engineering Division
U.S. Coast Guard Marine Safety Center

DEPT. OF HOMELAND SECURITY, USCG, CGHQ-10030
(REV. 3-03)

# Marine Sewage Treatment Systems- OMNIPURE™

OMNIPURE™ and MARINER OMNIPURE® systems are the only marine sewage systems that oxidize sewage in the electrochemical cell as well as generate NaOCl for the disinfection of the marine waste streams.

## OMNIPURE™ Overview

OMNIPURE units are suitable for installation in marine and offshore applications requiring marine sewage treatment. OMNIPURE marine sewage treatment units provide effective electrolytic treatment of both black and grey water through a patented and certified process.

OMNIPURE units meet personnel treatment capacities ranging from one to more than five hundred people. The systems range in capacity from 781 to 15,842 gals/day as individual units. Multiple units can be used in parallel for increases in capacity beyond individual unit capacity or to provide redundancy.

## OMNIPURE™ Certifications

- International Maritime Organization Resolution MEPC.2 (VI)
- United States Coast Guard Type Test Certified 33 CFR 59
- Certified for use in Hazardous Areas per NEC 501-1 of NFPA 70 (CL.1, C/D, Div.2)
- China Classification Society No. NYT02610001
- Russian Maritime Register of Shipping No. 97.143.009
- Certified by Nationally Recognized Testing Laboratory (NRTL)
  - UL508A
  - UL73
  - NFPA 70, UL1604 and NFPA 496
  - UL698A
  - Applicable sections of Article 500 of the National Electric Code (NEC)
- Bureau Veritas (BV) Type Certification to Directive (MED) 96/98/EC

## OMNIPURE™ Basic Operating Principles

The processing function of every OMNIPURE unit is the same – regardless of size. The automated process for generating an oxidant on-demand is simple and proven effective. Operation is semi-continuous, with continuous collection of sewage and cycle processing of the accumulated black and gray water.

- Raw sewage is collected via gravity into the system's V-1 influent collection tank.
- The OMNIPURE unit oxidizes and disinfects raw sewage by means of an electrochemical reaction in the bookcell.
- After the slurry of sewage and seawater has been electrolyzed in the bookcell, the stream is routed into the OMNIPURE unit V-2 residence tank.
- The V-2 tank is sized to provide a minimum 30-minute retention time to assure that any remaining bacteria will be exposed to the produced hypochlorite and killed, allows for any partially oxidized particles to settle and be returned to the V-1 tank for further processing.
- After retention in the V-2 tank, the effluent overflows from the top of the V-2 tank and gravity flows to the sea. If this discharge point is under the vessels waterline, the V-2 tank discharge is routed to a centrifugal overboard discharge pump for discharge to the sea.

## OMNIPURE™ System Benefits

- Effective electrolytic wastewater treatment
- Treats both black and gray waters
- Patented process
- Compact and lightweight with short retention periods
  - Requires less installation space- 10 times smaller than other systems
  - Unit operating weight is up to 10 times less than other systems
- Modular or skid-mounted units available
- Eliminates storage, handling and purchasing of hazardous chemicals
- No odor or sludge associated with process
- Easy-to-install, operate and service
- Accommodates varying crew sizes
- Operation is not hampered by cleaning fluids or effected by sea motion
- Operates on-demand, instantaneous on-off operation
  - Complete treatment of influent occurs in 30 minutes as compared to 30 hours with other systems
- 27 plus years experience

## OMNIPURE™ Applications

Marine Waste Water Treatment and Disinfection Markets Served:

- Offshore Oil & Gas Facilities
  - FPSPs and FSOs
  - Rigs and Platforms
- Marine, General
  - Work Boats
  - Tugs
  - Yachts
- Cruise Vessel and Passenger Ferry Industry
- Navies Worldwide

# Marine Sewage Treatment Systems- MARINER OMNIPURE®

## MARINER OMNIPURE® Overview

The MARINER OMNIPURE® series of marine sanitation devices offer a fresh approach to sewage treatment in the workboat and vessel markets. With treatment capacities of up to 60 persons (black water) and up to 25 persons (black and gray), the largest unit treats 1,796 gallons (6,800 Liters) of human wastewater per day. The USCG Certified Type II MARINER OMNIPURE units incorporate the same electrolytic treatment benefits of other OMNIPURE units, but with the added advantages of less maintenance and a small, compact size to fit vessels in the workboat and vessel markets.

## MARINER OMNIPURE® Certifications

- International Maritime Organization Resolution MEPC.2 (VI)
- United States Coast Guard (USCG) Type Test Certified 33 CFR 59
- China Classification Society No. NYT02610001
- Russian Maritime Register of Shipping No. 97.143.009
- Bureau Veritas (BV) Type Certification to Directive (MED) 96/98/EC

## MARINER OMNIPURE® Basic Operating Principles

The MARINER OMNIPURE® provides effective electrolytic treatment of both black and gray water through a patented and certified treatment process. Like other OMNIPURE products, this unit produces a sodium hypochlorite disinfection solution from seawater in the presence of sewage to effectively treat all sewage.

Electrolytic treatment of marine sewage eliminates chemical storage issues, dosing equipment and costs associated with the use of hazardous chemicals since the disinfection solution is produced onsite while the unit is in operation. A

closed-loop cell-cleaning feature allows maintenance to be performed on the cell without opening the cell and cleaning it by hand.

## MARINER OMNIPURE® Benefits

- Easy to install, operate and service
- Accommodates varying crew sizes
- Operation is not hampered by cleaning fluids
- Operates on-demand, instantaneous on-off operation
- Small footprint and weight
- Closed loop cell cleaning

## MARINER OMNIPURE® Applications

The compact MARINER OMNIPURE® marine sewage treatment systems are suitable for use in the workboat, crewboat and vessel markets.

# INSTALLATION & OPERATING DESCRIPTION
# DECHLORINATION UNIT
# OMNIPURE™ STANDARD OPTION "D"

---

This following Installation and Operating description is an aid for proper operation of this DeChlorination unit. Often referred to as the Sodium Sulfite unit.

**Please consult your Operations manual for Health and Safety warnings, and expanded unit operations.**

---


**THE SODIUM SULFITE (Na2SO3) MIXTURE IS NOT FOR HUMAN CONSUMPTION !**

**THE DUST OR MIST OF SODIUM SULFITE POWDER WILL IRRITATE OR BURN THE EYES.**

**ALL INSTRUCTIONS SHOULD BE FULLY READ PRIOR TO PERFORMING ANY TASKS.**

---


**Personal Protective Equipment (PPE)** is used to protect an individual from hazards found in the working area. When entering a specific work area, or prior to performing a work task, PPE is required such as: safety glasses, ear plugs, gloves (rubber), respirator, and etc.

This DeChlorination unit requires minimal Operator interface once the unit is set-up properly. The injection system is automatic. Insure all Electrical and Hydraulic utilities are connected and leak checked prior to starting unit for operation. The back page of this placard provides detailed Sodium Sulfite Mixing instructions and additional Operational instructions.

---

## DECHLORINATION CONTROL PANEL:

The supplied NEMA 4X control panel(CP) should be mounted in close proximity to the DeChlorination unit. This CP derives its power and signal controls from the Omnipure treatment unit's main control panel. This CP allows the DeChlorination unit to function in AUTO and HAND(manual) modes.

### ON / OFF MODE:

This mode controls the DeChlorination unit's operating power, either ON or OFF.


**When in OFF mode, BE AWARE THAT AC POWER MAY STILL BE APPLIED AT THE INCOMING POWER TERMINAL BLOCKS IF THE OMNIPURE UNIT'S MAIN POWER HAS NOT BEEN REMOVED.**

### AUTO MODE:

In this mode, the DeChlorination unit will function automatically in sequence with the Omnipure treatment unit. No manual intervention is required, other than insuring that the Sodium Sulfite level is maintained in the tank.

### HAND MODE:

In this mode, the system allows local control of the unit. When either the INJECTION PUMP or MIXER switch is placed in HAND mode, the Operator has manual control of the device.

**NOTE** When in HAND mode, the Operator is required to keep attention on the system since the pump can run dry, and cause possible damage. When task(s) are finished, return both control switches to the AUTO mode.

## MIXTURE of SODIUM SULFITE POWDER:

Acceptable Sodium Sulfite is common and is commercially available from many suppliers. See back of second placard for specific chemical and MSDS data.

Prepare the DeChlorination tank by first filling the tank with either fresh or seawater via the tank's water inlet valve(by others). Manually turn the agitator motor ON at the DeChlorination control panel. Slowly pour in a measured amount of Sodium Sulfite powder at 2.2 Lbs. per Gallon (or 1Kg per 4L) @ 68ºF(20ºC). Continue the mixing until the Sodium Sulfite is dissolved. Place the INJECTION PUMP and MIXER switches to their AUTO positions. The unit will now operate automatically with the Omnipure's treatment cycle. See other side for injection pump adjustment.

**NOTE** Saturation of mixture at temperatures lower than 68ºF(20ºC) requires less Sodium Sulfite. A drop in the normal operating temperature of the system may produce a thicker solution. Adding seawater gradually will bring the solution back into saturation.

## SETTINGS and OPERATION:

The injection pump starts and stops as the Omnipure unit starts and stops. To properly adjust the injection system, chlorine residual samples must be taken and the output of the injection pump adjusted until the residual is within the required limits.
Initial adjustment may be estimated by assuming a 10 mg/l residual. A table is shown below as a guideline for initial pump set-up. During operation, the residual will typically fluctuate. Use the table below for initial set-up of the injection pump and Sodium Sulfite consumption reference for your particular installation. “Round up” to the next whole number for pump dial setting.

| | | **Initial Injection Pump Settings (Stroke Rate at 50% Stroke Length)** | | | | | |
|---|---|---|---|---|---|---|---|
| Unit Size: | | 6MC | 7ME | 8MC | 12M | 12MX | 15MX |
| Unit Discharge Rate GPM(approx. L/min): | | 1.0 (4) | 2.0 (6.9) | 3.0 (10.4) | 5.0 (19) | 10.0 (38.6) | 20.0 (77.3) |
| | **PPM** | | | | | | |
| **Initial Chlorine Residual** | 1 | 0.22 | 0.39 | 0.58 | 1.06 | 2.16 | 4.32 |
| | 2 | 0.45 | 0.77 | 1.16 | 2.13 | 4.32 | 8.65 |
| | 3 | 0.67 | 1.16 | 1.75 | 3.19 | 6.48 | 12.97 |
| | 4 | 0.90 | 1.54 | 2.33 | 4.25 | 8.64 | 17.30 |
| | 5 | 1.12 | 1.93 | 2.91 | 5.31 | 10.80 | 21.62 |
| | 6 | 1.34 | 2.32 | 3.49 | 6.38 | 12.96 | 25.95 |
| | 7 | 1.57 | 2.70 | 4.07 | 7.44 | 15.12 | 30.27 |
| | 8 | 1.79 | 3.09 | 4.65 | 8.50 | 17.28 | 34.60 |
| | 9 | 2.01 | 3.47 | 5.24 | 9.57 | 19.43 | 38.92 |
| | 10 | 2.24 | 3.86 | 5.82 | 10.63 | 21.59 | 43.24 |

Residual Chlorine limits are set by the governing authority where the vessel or platform is operating.

# MATERIAL SAFETY DATA SHEET OVERVIEW

## GENERAL INFORMATION

- COMMON NAME: Sodium Sulfite
- MOLECULAR WEIGHT: 126.04 (avg)
- SPECIFIC GRAVITY: 2.63
- FORMULA: Na2SO3
- SYNONYMS: Disodium Sulfite, Na2SO3
- DOT Classification: Not Regulated.
- **THIS PRODUCT IS NOT FOR DRUG OR FOOD USE UNLESS SO LABELED**.

## PHYSICAL DATA

- Solid, Granular crystals or powder
- White to pale Yellow in color
- pH: 5% solution, approx. Ph = 9.8
- Vapor Pressure: Not Applicable
- % Volatiles by Volume: Not Applicable
- Evaporation Rate: Not Applicable
- Vapor Density: Not Applicable
- BOILING POINT: Decomposes 900ºC
- MELTING POINT: ND ºC
- Odorless
- Solubility in Water(% by Weight):
  17% solution @ 10ºC
  28% solution @ 33.4ºC
- STORE IN COOL DRY LOCATION(LESS THA N 80ºF)
- KEEP PRODUCT CONTAINER TIGHTLY CLOSED
- AVOID HIGH HUMIDITY WHEN STORED
- KEEP IN ORIGINAL CONTAINER

## REACTIVITY DATA

- STABILITY: Stable
- CONDITIONS TO AVOID: High Temperatures(at decomposition): yield sulfur dioxide gas and hazardous residue(see below).

- INCOMPATIBILITY: (MATERIALS TO AVOID):
  STRONG OXIDIZERS: Cause vigorous exothermic reactions.
  ACIDS: Releases sulfur dioxide gas (see below).

- HAZARDOUS POLYMERIZATION: Will Not Occur

- HAZARDOUS DECOMPOSITION PRODUCTS:
  Sulfur Dioxide gas – TOXIC AND CORROSIVE
  Sodium Sulfide residue – FLAMMABLE, DANGEROUS FIRE RISK, STRONG IRRITANT TO SKIN AND TISSUE, INCOMPATIBLE WITH ACIDS.

## ENVIRONMENTAL

- AQUATIC TOXICITY: 2600 ppm/24, 48 & 96 hr. /mosquito fish/TL/fresh water.
  Biological Oxygen Demand(BOD): 0.12 lb/lb, instantaneous. (USCG CHRIS System form SSF, “Sodium Sulfite”, Oct. 1978.
- EPA HAZARDOUS SUBSTANCES? > NO
- RCRA STATUS OF UNUSED MATERIAL IF DISCARDED – Not a “HAZARDOUS WASTE”.
- WASTE DISPOSAL METHODS:
  (Disposer MUST comply with Federal, State and Local disposal or discharge Laws)
  **Treatment or Disposal of waste generated by use of this product should be reviewed in terms of applicable Federal, State and Local laws and regulations.**

## HEALTH HAZARD INFORMATION – FIRST AID

| | |
|---|---|
| Eyes: | IMMEDIATELY FLUSH WITH LARGE AMOUNTS OF WATER FOR AT LEAST 15 MINUTES – **SEEK MEDICAL ATTENTION** |
| Inhalation: | REMOVE PERSON FROM AREA. TO FRESH AIR. IF BREATHING HAS STOPPED PERFORM CPR AND ADMINISTER OXYGEN IF AVAILABLE – **SEEK MEDICAL ATTENTION** |
| Skin: | Wash affected area with plenty of soap and water. |
| Ingestion: | **INDUCE VOMITING – SEEK MEDICAL ATTENTION.** NEVER INDUCE VOMITING IF PERSON IS UNCONSCIOUS. |

# TAB

## Attachment 2
## DRILLING FLUID PLAN

# Drilling Fluid Plan
## NPDES General Permit AKG-31-5022

2011 – 2016 EXPLORATION DRILLING PLAN

FURIE OPERATING ALASKA, LLC
KITCHEN LIGHTS UNIT

Kitchen Lights Unit #1
Kitchen Lights Unit #2
Kitchen Lights Unit #3
Kitchen Lights Unit #4
Kitchen Lights Unit #5

NORTH COOK INLET, ALASKA


Operator:

FURIE
Operating Alaska LLC

Furie Operating Alaska, LLC
1029 W. 3rd Avenue, Suite 500
Anchorage, AK 99501

**December 30, 2011**

# Table of Contents



# Glossary of Acronyms

| | |
|---|---|
| bbls | Barrels |
| BML | Below mud line |
| EPA | United States Environmental Protection Agency |
| G&I | Grind and inject |
| gal | Gallon |
| lbs | Pounds |
| lbs/bbls | Pounds per barrel |
| MSDS | Material safety data sheet |
| NOI | Notice of Intent |
| OCS | Outer Continental Shelf |
| P&A | Well plugging and abandonment |
| PPE | Personal protective equipment |
| ppg | Pounds per gallon |
| psi | Pounds per square inch |
| TVD | Total vertical depth |
| TOC | Top of casing |
| QA/QC | Quality assurance/quality control |
| WP | Work pressure |

# Section 1: Introduction

Furie Operating Alaska, LLC (Furie) is providing a notice of intent (NOI) for coverage under NPDES General Permit AKG-31-5000 regarding oil and gas exploration drilling to be conducted in state of Alaska coastal waters of the upper Cook Inlet. The purpose of the permit application will be to allow Furie authorized discharges during drilling activities in coastal waters through 2016.

Drilling will be conducted by jackup drill rig (Baker Marine Class 150 HC or smaller class) during ice-free months. Furie initial plans for drilling activities in coastal waters include a five-year, five well exploration program.

Furie provides this Drilling Fluids Plan to the U.S Environmental Protection Agency (EPA) as an attachment to its Notice of Intent (NOI) to use the NPDES General Permit AKG-31-5000, pursuant to 40 CFR Part 435, Subparts A and D, and as outlined and prescribed by the Permit.

## 1.1 Contact and Summary Discharge Information

Applicant (Owner/Operator)

| | |
|---|---|
| Owner Name: | Furie Operating Alaska, LLC |
| Telephone Number: | (907) 277-3726 |
| Operator: | Furie Operating Alaska, LLC |
| Telephone Number: | (907) 277-3726 |
| Operator Mailing Address: | 1029 Third Avenue, Suite 500<br>Anchorage, AK 99501 |

Facility

| | |
|---|---|
| Facility Name: | Spartan 151 |
| Contact Name: | Terry Parker |
| Telephone Number: | (985) 879-4552 |
| Beginning Date of Operation: | August 12, 2011 |
| Expected Duration of Operation: | 1,800 days |
| Facility Type: | Independent Leg Cantilever Jack-up Drilling Rig |

| | |
|---|---|
| Mobile Facilities | Kitchen Lights Unit #1 (additional wells #2, #3, #4 and #5) |
| Initial Latitude: | 60* 56’ 05.183” N, NAD 27 |
| Initial Longitude: | 151* 09’ 01.334” W, NAD 27 |

Receiving Water: Cook Inlet - Coastal Waters only

Proposed Location of Discharge within General Operating Area

| **Well Name** | **ADNR Lease #** | **Water Depths below MLLW** |
|---|---|---|
| EOC Kitchen Lights Unit #1 | ADL – 389198 | 36 ft. to 132 ft. |
| EOC Kitchen Lights Unit #2 | ADL – 389198 | 36 ft. to 132 ft. |
| EOC Kitchen Lights Unit #3 | ADL – 389926 | 36 ft. to 132 ft. |
| EOC Kitchen Lights Unit #4 | ADL – 389924 | 36 ft. to 132 ft. |
| EOC Kitchen Lights Unit #5 | ADL – 389917 | 36 ft. to 132 ft. |

# Section 2: Summary of Drilling Fluids

Table 1 provides a summary of Furie's proposed drilling program for each well, including volumes of drilling fluids and cuttings expected to be encountered during drilling operations. Table 1 is based on a well drilled to a total vertical depth (TVD) of 16,500 feet below mud line (BML).

**Table 3: Casing Program Design and Drilling Summary (example)**

| Hole Diameter | Casing Program (Type & O.D.) | Total Vertical Depth (BML) | Notes |
|---|---|---|---|
| 30" (Driven) | Conductor: 30" | 400 ft. | **No discharge related to driven structural casing** |
| 26" | Diverter String: 20" | 1,600 ft | **Conductor/Diverter String/Surface Interval drilled with pre-hydrated gel/seawater "spud mud" (water-based drill fluid).**<br>**Estimated volumes:**<br>• Drill fluids (NPDES Discharge Type 001): 5,850 bbls<br>• Drill cuttings (NPDES Discharge Type 001):12,000 bbls<br>**Disposal:** Discharge via shuntline |
| 17-1/2" | Surface: 13-3/8" | 4,800 ft | **Surface Interval drilled with pre-hydrated gel/seawater "spud mud" (water-based drill fluid).**<br>**Estimated volumes:**<br>• Drill fluids (NPDES Discharge Type 001): 8,520 bbls<br>• Drill cuttings (NPDES Discharge Type 001): 6,810 bbls<br>**Disposal:** Discharge via shuntline |
| 12-1/4" | Intermediate: 9-5/8" | 13,000 ft. | **Intermediate Interval drilled with pre-hydrated gel/seawater water-based drill fluid.**<br>**Estimated volumes:**<br>• Drill fluids (NPDES Discharge Type 001): 18,480 bbls<br>• Drill cuttings (NPDES Discharge Type 001): 8,750 bbls<br>**Disposal:** Discharge via shuntline |
| 8-1/2" | Liner: 7" | 16,500 ft | **Liner (12,700 ft to 16,500 ft) drilled with pre-hydrated gel/fresh water water-based drill fluid IF COAL STABILITY PROBLEMS ARE NOT ENCOUNTERED.**<br>**Estimated volumes:**<br>• Drill fluids (NPDES Discharge Type 001): 2,100 bbls<br>• Drill cuttings (NPDES Discharge Type 001): 950 bbls<br>**Disposal:** Discharge via shuntline<br>16,116' Top of Mid-Jurassic (Pre-Tertiary) |

# Section 3: Drilling Fluids Program

This section provides information on key products and drilling measures by casing interval for a typical well (16,500 feet TVD). This Drilling Fluids Program was prepared for the first well (KLU #1) by MI-Swaco, an industry leader in drilling fluid supplies and engineering.

*Executive Summary*

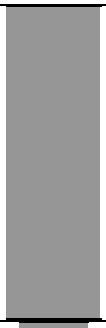
Kitchen Lights Unit #1 is an exploration well targeting the Hemlock, West Foreland and Mid-Jurassic formations. A 30" conductor will be driven to 400' MD. A 26" surface hole will be drilled to +/- 1,700' MD, where 20" casing will be run and cemented. The 17.5" interval hole will be drilled to +/- 4,800' MD with 13.375" casing run and cemented. The 12.25" interval will be drilled to +/- 13,000' MD with 9.625" casing run and cemented. 8.5" interval will be drilled to +/- 16,500' MD with a 7" liner run with TOL @12,700'.

Regulatory Compliance will be a critical part of the operation will involve monitoring, sampling testing and reporting on mud and cuttings prior to discharge. Requirements for this part of the operation are documented in the NPDES permit. Samples will be tested for compliance with results reported monthly and at the end of the well as required under the permit and described in detail in the attached SOP's.

Lost Circulation and Stuck Pipe potential are concerns, requiring close adherence to the drilling fluids program in maintaining key inhibition and loss prevention material concentrations throughout the operation.

Other project challenges include resupply of materials since deck storage space is very limited on the Offshore. Waste disposal options are also limited with possibility of annular injection well on the platform to accept mud and cuttings at this time.

# KITCHEN LIGHTS UNIT #1
# PROJECT SUMMARY

| Casing Size (in) | Hole Size (in) | Profile | Measured Depth (ft) | Mud Type | Estimated Waste Volume Generated Cuttings / Mud | Mud Density Range (ppg) |
|---|---|---|---|---|---|---|
| 30” | Driven |  | 400’ | NA | NA | NA |
| 20” | 26” |  | 1,600’ | **Gel Spud** | *Type 001 and 002*<br>**8,850 Bbls (cuttings)**<br>**12,000 Bbls (Mud)** | **9.3** |
| 13.375” | 17.5” |  | 4,800’ | **KlaShield** | *Type 001 and 002*<br>**8,520 Bbls (cuttings)**<br>**6,810 Bbls (mud)** | **9.5** |
| 9.625” | 12.25” |  | 13,000’ | **KlaShield** | *Type 001 and 002*<br>**1,8480 Bbls (cuttings)**<br>**8,750 Bbls (mud)** | **10.4 – 11.5** |
| 7” | 8.5” |  | 16,500’ | **KlaShield** | *Type 001 and 002*<br>**2,100 Bbls (cuttings)**<br>**950 Bbls (mud)** | **14 – 16.6** |

**Note: Cuttings volume is gauge hole calculation**
**Mud on cuttings is based on minimum of 3 to 1 ratio**
**Volume of dilution and disposal not included**

| 26” Surface Interval | |
|---|---|
| Drilling Fluid System | Spud Mud |
| Key Products | MI Gel, Gelex, Caustic Soda, DUOVIS, PolyPac Supreme UL, SODA ASH, DESCO CF |
| Solids Control | Shakers, Desander, Desilter, Centrifuge |
| Potential Problems | Large gravel sizes can cause hole-cleaning problems.<br>Sticky clays in the permafrost can slow ROP from bit and BHA balling.<br>Swabbing in the clays may also be a problem.<br>Hydrates are not expected.<br>Wash out in unconsolidated sections.<br>To help insure good cement to surface after running the casing, and if practical, condition mud to a funnel viscosity of ~ 55 – 100 sec/qt prior to cementing the casing. |
| Interval Objectives | Provide adequate viscosity to clean the hole of drill cuttings<br>Minimize time in hole section<br>Condition mud to provide a good cement job |

SURFACE INTERVAL MUD PROPERTIES

| Depth MD (FT) | Mud Wt. (LB/GAL) | Funnel Viscosity (sec/qt) | Plastic Viscosity | Yield Point (lb/100ft²) | API Fluid Loss (ml/30min) | LGS (%) | pH |
|---|---|---|---|---|---|---|---|
| 0 – 1,700’ | 8.7 – 9.3 | 200 initial<br>100 final | 30 - 55 | 45 - 60 | NC - 8.0 | < 6.0 | 9.0 – 9.5 |

## IFE Benchmark and Goals

| IFE Benchmarks |
|---|
| No Stuck Pipe |
| No Mud Related HSE Incidents or Spills |
| Casing/Liner to Bottom |
| Well specific: safely drill & test exploration well |

| Surface Interval Fluid Formula | | |
|---|---|---|
| Product | Conc/Bbl | Function |
| Soda Ash | As needed | Remove hardness buffer pH |
| DRILZONE | 0.25 – 1.5% v/v | Anti accretion/Bit balling(while drilling) |
| PolyPac UL | 0.25 – 1.0 ppb | As needed for API FL |
| M-I Gel | 20-25 ppb | Rheology |
| M-I WATE | As needed | Density |
| SCREENKLEEN | .5-1% v/v | Screen Blinding (as needed) |

## Recommended Solids Control Equipment

| | |
|---|---|
| Shakers | Initial spud in, install 84's on all shakers.<br>Screen up to 110 & 140 mesh screens on shaker.<br>Change screens accordingly and record usage on daily mud report.<br>Check screens for holes between connections. |
| De-Silter | Inspect all cone bodies and apexes, replace as necessary. Make sure that ½" Apexes are installed if the Desander is not to be run.<br>Ensure that Ft. of Hd. Gauge is available and working properly at the De-Silter, not the pump. Ensure that De-Silter feed pump can achieve 95' of head. *CRITICAL!*<br>The underflow from all the hydroclones should be in a spray discharge if working properly |
| Centrifuge | Run as needed to control low gravity solids. The speed on the centrifuge should be set at 2,500 rpm to allow more fluid to be processed and discharge more cuttings. Refer to mud man for solids information to determine speed and feed rate of centrifuge. |

## Surface Interval Concerns

A modified M-I Gel/Gelex spud mud is recommended for the surface interval. Initial viscosities of 100 - 200 sec/qt should be used depending on formations drilled. Gravels and sandstones may require more viscosity while clay formations may require dilution to keep viscosity from becoming too high.

The 20" surface casing will be set and the cement will be pumped to surface. Keep the mud temperature as low as possible, preferably less than 60° F at the flow line to minimize permafrost melt out and hole problems.

- Dilution rates of 80-100 bbls/hr of fresh water may be required to maintain a mud weight <9.5 ppg by TD. This will allow the spud mud to not become dehydrated.
- Sticky clays can slow ROP from bit and BHA balling. Add 0.5 - 1.0% SCREENKLEEN or DRILZONE to the system and incorporate Nut Plug in sweeps (as allowed by MWD tools) to minimize clay to metal sticking if needed.
- As drilling progresses begin to increase the proportion of polymer (Duovis) additions, while reducing the quantities of MI Gel that is used to maintain the rheology of the fluid and provide a yield point of 40+; this will enhance the hole cleaning operations.
- Reduce API fluid loss (<8 cc/30 min) as casing point is reached with additions of 1 ppb Poly Pac UL to minimize filter cake thickness and possible associated tight hole conditions across any sand sections.
- Adjust low end rheology, ROP, pipe rotation speed (80-100 rpm), pipe running speeds and pump rates as needed to insure proper hole cleaning and ECD. Watch for any indications of wellbore instability problems. Any fluid weight adjustments should be performed in 0.1- 0.2 lb/gal increments if absolutely necessary.
- High viscosity sweeps containing 2-3 ppb Duovis, or a weighted sweep at +2.5 ppb of mud density, can be pumped to aid in hole cleaning if necessary.
- To help ensure good cement to surface after running the casing, and if practical for existing hole conditions, condition mud to a funnel viscosity of 50 – 70 sec/qt (10-15 YP) prior to cementing the casing but after the casing is on bottom. Have adequate supply of fresh water on hand to ensure the desired rheologies can be achieved.

## Surface Interval Recommendations

1. Spud mud will be mixed on the rig once the rig is spotted over the well. Add 0.25 ppb Soda Ash and 30 ppb M-I Gel to the make-up water and allow hydrating for 4 – 6 hours prior to drilling.

2. Just prior to spud, add Gelex, ***as needed***, to raise viscosity to +/- 300 sec/qt. Maintain viscosity as required using M-I Gel/Gelex to clean the hole.

3. Drill ahead maintaining volume with additions of water, M-I Gel and Gelex as needed.

4. Run all solids control equipment. Run 84 to 110 mesh shaker screens to maintain a wet discharge for enhanced solids removal. Add drill water below shaker to avoid washing unwanted solids back into the active system. Watch for "*excessively wet" cuttings* and change screens to a larger mesh should this occur.

5. ADD DRILZONE OR SCREENKLEEN IF SCREEN BLINDING OCCURS.

6. Lower API fluid loss with PolyPac Supreme UL as surface casing point is reached.

7. To control rheology additions of *Desco CF* may be needed.

8. Add Mix II medium while drilling across any permeable sands to prevent clay balling from excess wall cake.

9. Pump a Mix II fiber sweep at TD to help seal off any permeable sands and prevent wall sticking on the subsequent casing run.

10. A hi vis pill can be spotted across the permeable sands before tripping out of the hole to run casing.

11. If hole conditions allow, let the funnel viscosity drop to +/- 55 – 65 sec/qt prior to cementing of the casing. Allow surface mud volumes to fall during the later stage of this interval to minimize waste fluid disposal costs.

12. Regulatory Compliance

    Insure all samples are collected, field sheen tests are performed and product concentrations are monitored.

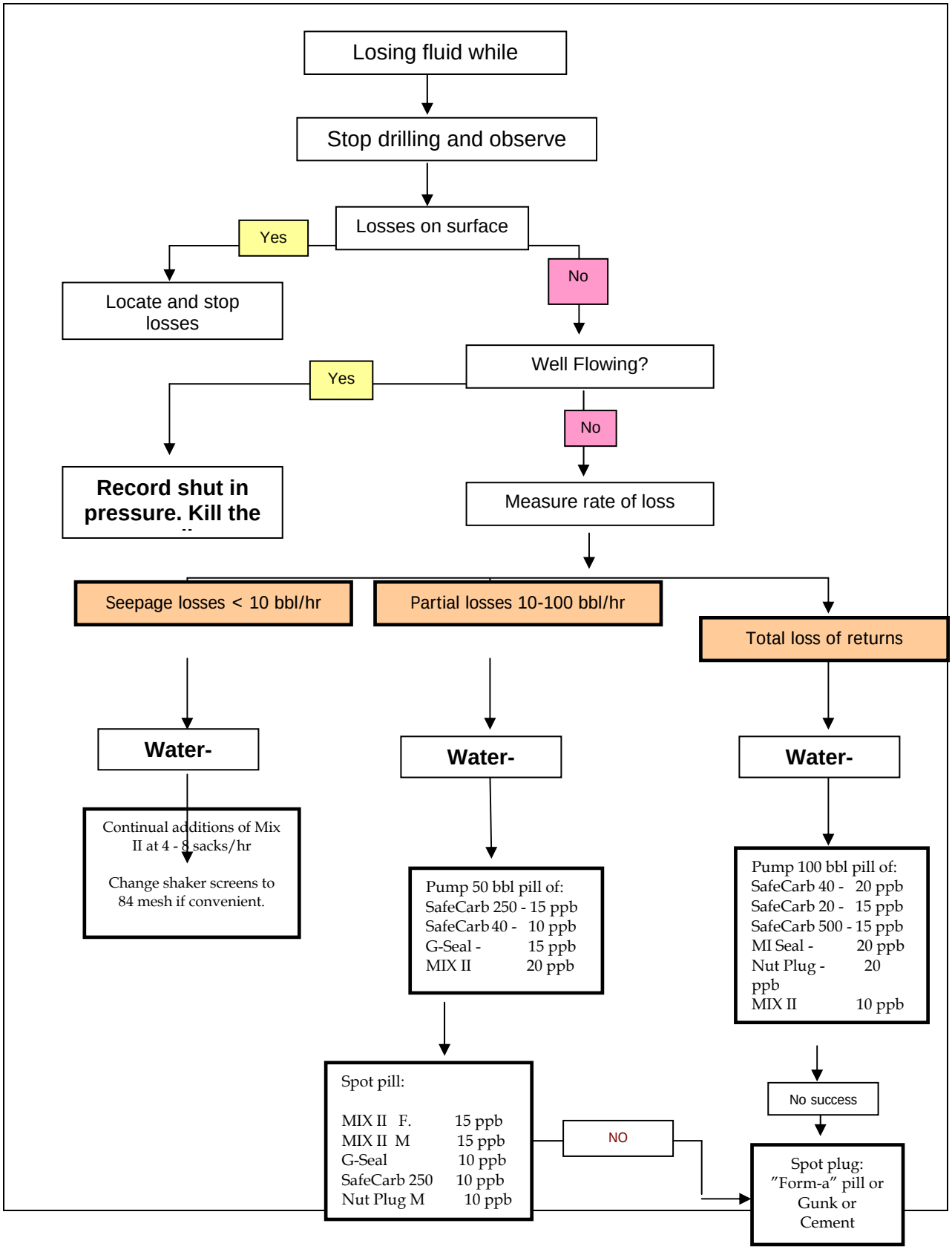
    Maintain daily discharge work sheet and monitor all discharges to insure the maximum 500 gph is not exceeded.

    NOTE- This includes seawater used to flush the mud and cuttings discharge line

    Fill out chain of Custody forms on all samples being shipped out for analysis. (Retain a copy with the well file)

    Make sure samples are properly stored (Some require maintaining a maximum temperature) and shipped in a timely manner.

*Lost Circulation Recommendations for WBM – Surface Interval Fluid*



| 17.5" Hole Interval | | | | | |
|---|---|---|---|---|---|
| Drilling Fluid System | KLASHIELD WBM System | | | | |
| Key Products | KLASTOP, NaCl, KCl, Duovis, PolyPac UL, Safe-Carb 20, Safe-Carb 40, Resinex, Asphasol Supreme | | | | |
| Potential Problems | ▪ Excessive ROP and hole cleaning<br>▪ Seepage losses<br>▪ Sloughing coal<br>▪ Torque and drag | | | | |
| Interval Objectives | ▪ Adequately clean hole using pipe rotation, good fluid properties and ROP<br>▪ Minimize solids buildup with use of all solids control equipment<br>▪ Maintain minimal ECD to prevent microfractures in formations | | | | |
| PRODUCTION INTERVAL MUD PROPERTIES | | | | | |
| Depth MD (FT) | Mud Wt. (LB/GAL) | Yield Point ($lb/100ft^2$) | Fluid Loss (ml/30min) | 6 rpm | Drill Solids (%) |
| 1,700 – 4,800 | 9.5 | 20 - 28 | < 7 | > 16 | < 6 |

## BENEFITS ASSOCIATED WITH THE *KLA-SHIELD* SYSTEM ARE:

Mid-level inhibitive water-based fluid

- Superior chemical stabilization in claystones
- Superior stabilization in fractured shales
- Reduced clay dispersion and hydration
- More tolerant to contamination with drill solids

Environmentally acceptable

- Lower dilution rates and gauge wellbore
- Lower disposal volumes

Economically acceptable

- Low dilution rates
- Low volumes for disposal
- Potentially reusable
- Minimal hole problems

Engineering Friendly

- Few products
- Tests for concentration of key components
- Tolerant to contamination

Flexible

- Readily mixed at rig site
- Flexible to meet geological requirements
- Flexible to meet performance requirements
- Flexible from 8.5 – 16 ppg and to 250°F

| KLASHIELD MUD FORMULATION | | |
|---|---|---|
| Product | Conc/Bbl | Function |
| Conqor 404* | 2 ppb | Corrosion control |
| DRILZONE | 0.5 – 1.5% v/v | Anti accretion/Bit balling (as needed) |
| PolyPac UL | 2.0 ppb | API FL |
| Duovis* | .75 – 1.5 ppb | Rheology |
| KlaStop* | 8 -10 ppb | Shale/Clay Inhibition |
| LoTorq | 1 – 3% v/v | Not to exceed 3% total lubes |
| M-I Gel (Prehydrated) | 5 ppb | API FL (If needed) |
| Potassium Chloride * | 6.4 ppb (MAX) | Shale Inhibition |
| Sodium Chloride * | 33 ppb | Shale Inhibition/Density |
| Resinex | 2 - 6 ppb | Fluid Loss (If needed) |
| Sack Black* | 4 – 6 ppb | WBS/Loss prevention |
| Safe-Carb 20* | 10-20 ppb | Bridging material |
| Safe-Carb 40* | 10-20 ppb | Bridging material |
| SCREENKLEEN | .5 – 1% v/v | Screen Blinding (as needed) |
| Sodium Metabisulfite | As needed | Oxygen scavenger 200-300 ppm excess |
| Asphasol Supreme* | 4 - 6 ppb | Coal/Shale stabilization |

* PRODUCTS USED IN INITIAL FLUID MAKE UP.
FOLLOW KLASHIELD ENGINEERING GUIDELINES SUPPLIED TO MUD ENGINEERS WHEN FIRST BUILDING SYSTEM.

## Interval Operations

1. Maintain flow rates as per hole cleaning guidelines (see below) to ensure adequate hole cleaning. ECD management will be critical in the later portions of this well. Control the ROP and flow rates to avoid inducing a breakdown of the sands. Reduce pump rates immediately if packing off occurs. Pump weighted sweeps and ream carefully to clean the hole before proceeding with further drilling. The best indication of a sufficiently cleaned hole is the amount of cuttings observed at the shakers. Pipe rotation (> 100 rpm), adequate rheological properties and flow rate, short trips and avoiding excessive ROP prove to be the best method of ensuring adequate hole cleaning.
2. While drilling adjust rheology, ROP, pipe rotation speed, pipe running speeds and pump rates as needed to balance hole cleaning and ECD.
3. Utilize +1.5 lb/gal weighted sweeps using SAFE-CARB 40 and tandem sweeps (low viscosity/weighted) if needed for sweeping the hole clean.
4. Drill ahead watching for well bore instability problems. Any fluid weight adjustments should be performed in 0.1- 0.2 lb/gal increments using either M-I WATE or SAFE-CARB 40 as weighting agent and bridging agent.
5. Run the centrifuge to remove drill solids and maintain the rheology. This will require the addition of SAFE-CARB 40 to maintain acceptable bridging characteristics.
6. Fluid Loss Control: Use a modified HTHP. The HTHP should be equipped with a 20 micron aloxite disk (or as close to the permeability of the formation).
7. Monitor rheological properties and retort results for determining dilution requirements.

| 12.25“ Hole Interval | | | | | |
|---|---|---|---|---|---|
| **Drilling Fluid System** | KLASHIELD WBM System | | | | |
| **Key Products** | KLASTOP, NaCl, KCl, Duovis, PolyPac UL, Safe-Carb 20, Safe-Carb 40, Resinex, Asphasol Supreme | | | | |
| **Potential Problems** | ▪ Excessive ROP AND hole cleaning<br>▪ Seepage losses<br>▪ Sag<br>▪ Torque and drag | | | | |
| **Interval Objectives** | ▪ Adequately clean hole using pipe rotation, good fluid properties & ROP<br>▪ Maintain minimal ECD by minimizing drill solids accumulation | | | | |
| **PRODUCTION INTERVAL MUD PROPERTIES** | | | | | |
| **Depth MD (FT)** | **Mud Wt. (LB/GAL)** | **Yield Point ($lb/100ft^2$)** | **Fluid Loss (ml/30min)** | **6 rpm** | **Drill Solids (%)** |
| 4,800 – 13,000 | 10.4 – 11.5 | 20 - 28 | < 5 | > 12 | < 6 |

***FLUID FROM 17.5” HOLE SECTION CAN BE RECONDITIONED AND REUSED FOR THIS HOLE SECTION SO MINIMAL NEW FLUID WILL BE NECESSARY.**

## Interval Drilling Concerns

- Regulatory Compliance - Follow all NPDES permit requirements.
- HSE – EMPLOYEE AND ENVIRONMENTAL SAFETY ARE THE NUMBER ONE CONCERNS OF THE PROJECT. ANY EMPLOYEE WHO SEES AN UNSAFE SITUATION OR OPERATION IS EMPOWERED AND OBLIGATED TO STOP ANY OPERATION UNTIL THOSE CONCERNS HAVE BEEN CORRECTED OR ADDRESSED. SPILL PREVENTION THROUGH PROACTIVE PLANNING, ROUTINE INSPECTIONS AND OBSERVATIONS WILL HELP ENSURE ZERO SPILLS THROUGHOUT THE OPERATION.
- LOST CIRCULATION
  - LITHOLOGY FOR THIS INTERVAL IS EXPECTED TO CONSIST OF COAL, SHALE AND DEPLETED SANDS. SACK BLACK, SAFECARB 20 & 40 AND ASPHASOL SUPREME ADDITIONS SHOULD BE MADE AS RECOMMENDED IN THE PRODUCTION FLUIDS FORMULA SECTION.
  - ECD’S - DUE TO THE REQUIRED FLUID WEIGHTS IN THE LOWER SECTION OF THIS INTERVAL, ECD WILL NEED TO BE MONITORED CAREFULLY TO AVOID LOSSES.
  - CONTROL THE ROP AND FLOW RATES TO AVOID HOLE CLEANING PROBLEMS WHICH MIGHT INDUCE A PACK-OFF AND SUBSEQUENT BREAKDOWN OF THE FORMATIONS.
  - REDUCE PUMP RATES IMMEDIATELY IF PACKING OFF OCCURS.
  - PUMP HIGH VISCOSITY SWEEPS AND REAM CAREFULLY TO CLEAN THE HOLE BEFORE PROCEEDING WITH FURTHER DRILLING.
  - TRIPPING AND CASING RUNNING SPEEDS SHOULD BE MONITORED CLOSELY AND AVOID SURGING AND SWABBING.
  - RHEOLOGY AND MUD WEIGHT SHOULD ALSO BE HELD WITHIN SPECIFICATIONS
- ANY FLUID WEIGHT ADJUSTMENTS MADE WHILE DRILLING SHOULD BE PERFORMED IN 0.1 - 0.2 PPG INCREMENTS.
- ENSURE THAT THE FLUID PROPERTIES ARE MAINTAINED TO PROVIDE THE BEST POSSIBLE HOLE CLEANING. MAINTAIN MUD WEIGHTS AS PER PROGRAM GUIDE LINES OR AS DICTATED BY WELL CONDITIONS. MONITOR FOR ANY FLUID LOSSES AND FLOW BACK CLOSELY.
- LUBRICANTS ARE NOT EXPECTED TO BE NEEDED. IF LUBRICANTS ARE NEEDED, ONLY USE LOTORQ AND DO NOT EXCEED 3% V/V TOTAL.

## COAL MITIGATION

COAL SEAMS IN COOK INLET ARE HIGHLY ANISOTROPIC AND INCLINED TO CREEP AND SLOUGH. COAL IS USUALLY HIGHLY MICRO-FRACTURED, ALLOWING RAPID FILTRATE INVASION AND PORE PRESSURE PENETRATION. FOUR-ARM CALIPER LOG DATA THROUGH COAL BEDS OFTEN SHOW A HIGH DEGREE OF BOREHOLE OVALISATION THAT IS TYPICALLY INDICATIVE OF DIRECTIONAL TECTONIC STRESS. WHEN A DIRECTIONAL STRESS IS PRESENT, COAL CAVING IS USUALLY EXACERBATED DUE TO THE INHERENT ANISOTROPY OF THE COAL. A FOUR-ARM CALIPER LOG DIFFERENTIAL IN SHALE CAN BE COMPARED WITH THE DIFFERENTIAL IN COAL TO DETERMINE WHETHER THE TECTONIC STRESS (IF PRESENT) APPLIES EQUALLY IN BOTH LITHOLOGIES. LARGE DIFFERENCES INDICATE THE COAL IS HIGHLY UNSTABLE AT THE GIVEN MUD DENSITY. SMALL DIFFERENCES INDICATE TECTONIC STRESS IS THE DOMINANT FACTOR. UNSTABLE COALS MUST BE DRILLED PATIENTLY. THEY MUST BE ALLOWED TO CREEP INTO THE HOLE. LARGE INFLUXES (BREAKOUT) OF COAL MAY CAUSE PACK-OFF. FAST COAL DRILLING WILL CAUSE LARGE QUANTITIES OF COAL SLOUGHING. IF THE COAL CONTAINS EMBEDDED METHANE GAS, THEN ADDITIONAL MUD DENSITY* IS LIKELY TO BE REQUIRED TO HELP REDUCE COAL SPALLING CAUSED BY METHANE VENTING FROM THE COAL MATRIX.

MUD SYSTEM RECOMMENDATIONS AND MUD ENGINEERING PRACTICES

WHEN COAL SEQUENCES ARE ENCOUNTERED CHECK THE SHALE SHAKERS TO DETERMINE COAL CUTTINGS PROFILE - NORMAL CUTTINGS SIZE OR "CHUNKS". HIGHER RHEOLOGY WILL IMPROVE HOLE CLEANING, PROVIDED THE FRACTURE PRESSURE IS NOT EXCEEDED IN HIGHLY ANISOTROPIC COALS, CAUSING WHOLE MUD LOSSES IN THE MINIMUM STRESS DIRECTION. BLACK PRODUCTS SUCH AS ASPHASOL SUPREME, RESINEX, VENTROL 401 WILL REDUCE THE POSSIBILITY OF EXCESSIVE LOSSES (OVER 60 BPH) AND CAN BE SUPPLEMENTED WITH SIZED CALCIUM CARBONATE FOR ADDITIONAL PLUGGING OF FRACTURES. PH SHOULD BE KEPT BETWEEN 9 - 9.5 TO PREVENT COAL SOLUBLISATION AND REDUCTION IN RHEOLOGY WHICH WILL BE CRITICAL IN AN LSND MUD SYSTEM. THIS WILL EXACERBATE ANY HOLE CLEANING PROBLEMS. ADD MORE XC POLYMER (DUOVIS) TO COUNTERACT ANY DETERIORATION IN FLOW PROPERTIES. IF DEEMED APPROPRIATE, USE HIGH DENSITY* AND OR HIGH VISCOSITY SWEEPS TO 'FLOAT' LARGER PIECES OF COAL OUT OF THE HOLE.

MUD DENSITY* - ANY INCREASES CONSIDERED NECESSARY MUST BE APPLIED *CAUTIOUSLY* TO CONTROL COAL SLOUGHING. RAPID DENSITY INCREASES MAY CAUSE WHOLE MUD LOSSES. INCREASED ECD IN THE HOLE SECTION MAY CONTRIBUTE TO MICRO-FRACTURE FILTRATE INVASION AND FRACTURE TRANSMISSION. OVERBALANCE AND ECD SHOULD BE KEPT AS LOW AS POSSIBLE TO AVOID FURTHER DESTABILIZATION. LOW DYNAMIC FLUID LOSS CONTROL WILL HELP MINIMIZE FILTRATE INVASION AND PORE PRESSURE PENETRATION INTO MICRO-FRACTURES. THE USE OF DEFORMABLE MICRO-FRACTURE PLUGGING AGENTS SUCH AS ASPHALTIC MATERIALS WILL REDUCE DYNAMIC FILTRATE LOSS. THIS WILL PRODUCE A THIN FILTER CAKE ACROSS MICRO-FRACTURES AND IMPART COHESIVE STRENGTH TO THE BOREHOLE WALL.

RECOMMENDED DRILLING PRACTICES FOR MODERATE TO SEVERELY UNSTABLE COAL SEQUENCES

IF THE DRILL STRING IS TENDING TO JAM, BACK OFF THE WEIGHT AND ROTATE TO BREAK UP LARGE PIECES. THIS WILL ALLOW COAL CHUNKS TO CIRCULATE PAST THE BHA. LIMIT MECHANICAL DESTABILIZATION OF THE BOREHOLE WALL. MINIMIZE TRIPS REAMING AND BACK REAMING IF POSSIBLE. DRILL WITH THE MINIMUM NUMBER OF STABILIZERS POSSIBLE. DRILL WITH A LOW WOB AND HIGH RPM, RATHER THAN HIGH WOB. CONTROL THE DRILLING RATE TO PREVENT OVERLOADING OF THE ANNULUS IF THE COAL IS TENDING TO BREAK OUT / SLOUGH.

IN SEVERE CONDITIONS:

- COAL SEQUENCES ARE AFFECTED BY SURGE
- DO NOT SET THE PIPE IN THE SLIPS WITH THE PUMPS ON.
- START THE MUD PUMPS UP SLOWLY.
- REAM DOWN SLOWLY.
- DRILL NO MORE THAN ONE (1) FOOT OF COAL AT A TIME.
- BACK REAM 20 - 30 FT OUT OF IT.
- CIRCULATE 2 - 3 MINUTES.
- REAM DOWN TO BOTTOM SLOWLY.
- CHECK TORQUE, DRAG AND PUMP PRESSURE BEFORE STARTING TO DRILL AGAIN. IF PARAMETERS ARE NOT NORMAL, DO NOT DRILL FURTHER. CONTINUE WORKING PIPE AND CIRCULATING UNTIL PARAMETERS ARE NORMAL.
- IF HOLE IS TIGHT, DO NOT OVER PULL MORE THAN 20 - 30M OVER NORMAL DRAG BEFORE GOING BACK DOWN.

| 8.5” Hole Interval | | | | | |
|---|---|---|---|---|---|
| Drilling Fluid System | KLASHIELD WBM System | | | | |
| Key Products | KLASTOP, NaCl, KCl, Duovis, PolyPac UL, Safe-Carb 20, Safe-Carb 40, Resinex, Asphasol Supreme, Sack Black | | | | |
| Potential Problems | ▪ Excessive ROP AND hole cleaning<br>▪ Seepage losses<br>▪ Sag<br>▪ Torque and drag | | | | |
| Interval Objectives | ▪ Adequately clean hole using pipe rotation, good fluid properties & ROP<br>▪ Maintain minimal ECD by minimizing drill solids accumulation | | | | |
| PRODUCTION INTERVAL MUD PROPERTIES | | | | | |
| Depth MD (FT) | Mud Wt. (LB/GAL) | Yield Point ($lb/100ft^2$) | Fluid Loss (ml/30min) | 6 rpm | Drill Solids (%) |
| 13,000 – 16,500 | 14 – 16.6 | 18 - 24 | < 5 | > 9 | < 5 |

## *Interval Operations*

- DRILL OUT AND PERFORM THE FIT OR LOT.
- CONDITION FLUID - PRIOR TO DRILLING AHEAD, SHAKERS SHOULD BE SCREENED COARSE ENOUGH TO ALLOW CIRCULATING AND CONDITIONING OF NEW FLUID. THIS WILL BE REQUIRED IN ORDER TO PREVENT THE SACK BLACK FROM BLINDING THE SHAKERS WHILE DRILLING. ONCE THE FLUID IS CONDITIONED, THE SHAKERS SHOULD BE SCREENED BACK UP PRIOR TO DRILLING.
- PARTICLE SIZE DISTRIBUTION - WHILE DRILLING AHEAD, THE LARGER BRIDGING PARTICLES WILL BE CONTINUALLY STRIPPED FROM THE SYSTEM BY SHAKER SCREENS AND CENTRIFUGE. ADDITIONS OF SAFECARB BRIDGING MATERIAL SHOULD BE MADE WITH SAFECARB 40 TO ENSURE HIGH END PARTICLES ARE MAINTAINED IN THE SYSTEM.
- INHIBITION – SHALE CUTTINGS SHOULD BE FIRM AND UNIFORM IN SIZE AND SHAPE WITH PROPER INHIBITION. IF CUTTINGS BECOME SOFT AND STICKY, KLASTOP CONCENTRATIONS SHOULD BE INCREASED. TO AVOID DEPLETION, A KLASTOP CONCENTRATION TEST SHOULD BE PERFORMED AT LEAST TOURLY AND MORE IF DRILLING IN A HIGHLY REACTIVE FORMATION. ALWAYS MAINTAIN EXCESS KLASTOP IN THE FLUID SYSTEM TO HELP INSURE GOOD INHIBITION AND WELL BORE STABILITY.
- DRILL AHEAD USING POLYPAC UL AND RESINEX TO CONTROL API FL. DUOVIS MAY BE USED TO ADJUST RHEOLOGIES UPWARD IF NEEDED.
- WATER MUST BE ADDED WHILE MIXING MI WATE PARTICULARLY FOR WEIGHT OF 15 PPG OR HIGHER. FREE WATER MUST BE AVAILABLE IN MUD SYSTEM TO PREVENT DEHYDRATION WHILE TRIPPING OR RUNNING LOGS / CASING.
- RUN VIRTUAL HYDRAULICS TO ENSURE THE FLOW RATE IS WITHIN THE GOOD TO VERY GOOD HOLE CLEANING RANGE.
- WATCH FOR INDICATIONS OF HOLE CLEANING PROBLEMS. ADJUST RHEOLOGY, FLOW RATES, AND DRILLING TO BEST MANAGE ANY ISSUES WHICH MAY ARISE.
- UPON REACHING TD WATCH BOTTOMS-UP CUTTINGS CLOSELY. IF THE WELL DOES NOT READILY CLEANUP AFTER THE FIRST HIGH DENSITY SWEEP OR IF THERE ARE ANY EXCESS OF TORQUE, DRAG, PICK-UP OR SLACK-OFF WEIGHTS, PUMP A SECOND HIGH VISCOSITY /WEIGHTED SWEEP AND OBSERVE BOTTOMS UP AGAIN. CIRCULATE TO CLEAN THE HOLE AND CONDITION MUD FOR RUNNING CASING.
- CLOSELY MONITOR TRIPPING SPEEDS ESPECIALLY WHILE RUNNING CASING.

*Hole Cleaning Guidelines*

Hole cleaning efficiency is affected by hole size, washouts, drill pipe diameter, flow rate, rotary speed, mud rheology, wellbore trajectory, cuttings size, pipe reciprocation, % sliding, penetration rate, wellbore stability, mud solids and cuttings dispersion.

*Some of the industry "RULES OF THUMB" for rotation and flow are as follows:*

1. Rotation effects:
   - 17.5" hole: 150+rpm (inhibitive fluid)
   - 12 1/4" hole: 150 rpm (low side 120)
   - 9 7/8" hole: 120 rpm (low side 100)
   - 8 1/2" hole: 150 rpm (low side 100)
   - 6 3/4" hole: 120 rpm (low side 80)

2. Flow rate:
   - 17.5" hole: 800 – 1000 gpm (750 low side)
   - 12 1/4" hole: 800 – 1000 gpm (700 low side)
   - 9 7/8" hole: 550 – 650 gpm (500 low side)
   - 8 1/2" hole: 400 – 500 gpm (350 low side)
   - 6 3/4" hole: 250 – 300 gpm (200 low side)

| WELL INCLINATION RANGE | SECTION LENGTH FACTOR | | |
|---|---|---|---|
| | 17-1/2 inch HOLE | 12-1/4 inch HOLE | 8-1/2 inch HOLE |
| $0^o$ - $10^o$ | 1.5 | 1.3 | 1.3 |
| $10^o$ - $30^o$ | 1.7 | 1.4 | 1.4 |
| $30^o$ - $60^o$ | 2.5 | 1.8 | 1.6 |
| $60^o$ + | 3.0 | 2.0 | 1.7 |

Procedure

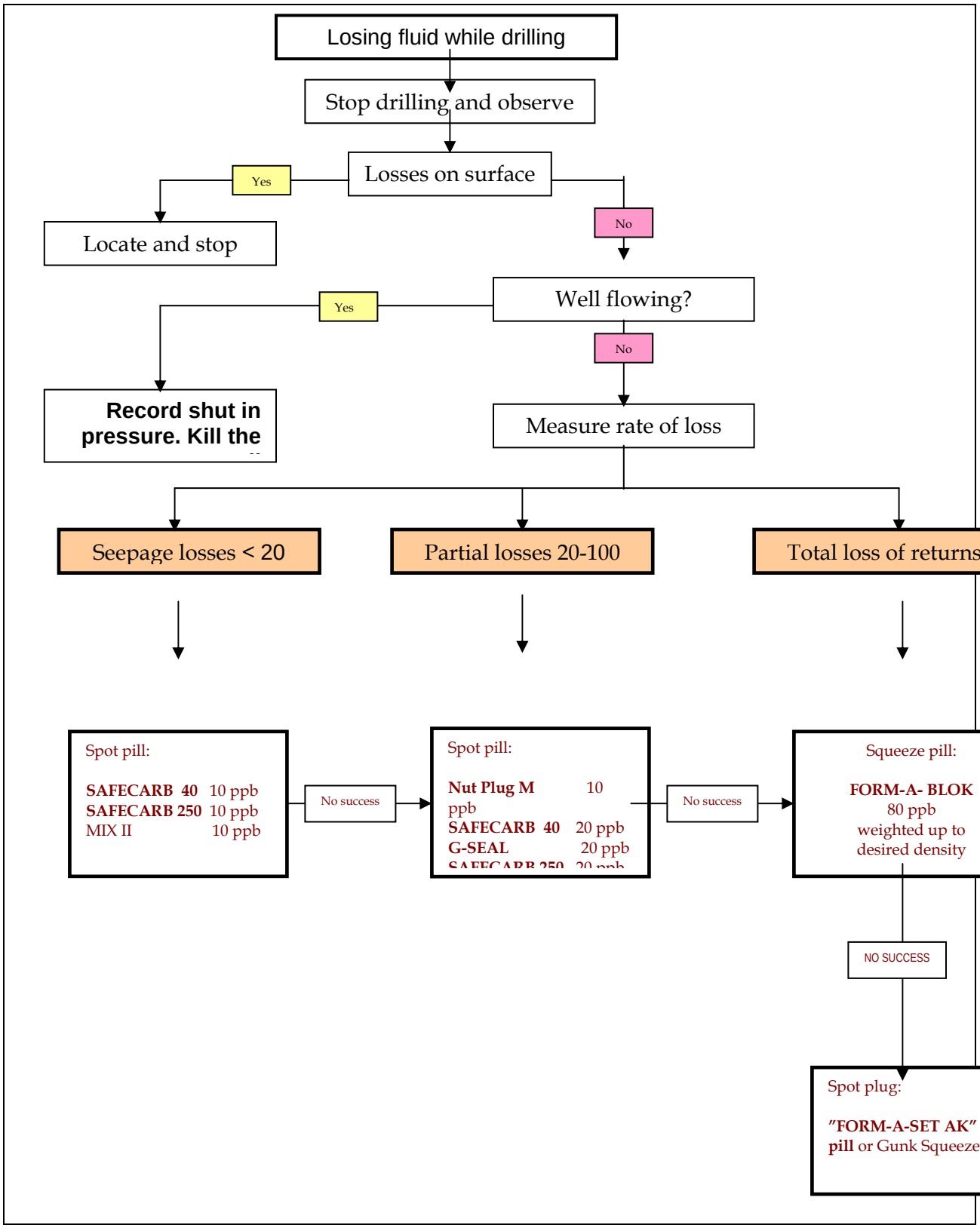
1. Effective length = Section length x section length factor.
2. Circulation time = $\frac{\sum \text{Effective Length}}{\text{Measured depth at Bit}}$ x B/U

*One bottoms up in highly deviated wells is never enough*

Also consider the following:

1. Good cuttings flow equates to good hole cleaning. The goal is to always keep the volume of cuttings in the hole manageable. This means no packing off or no tight hole.
2. When tripping, the hole must be clean enough for the BHA that is being used. The junk slot area affects how thick a safe cuttings bed can be. All bypass areas should be considered (stabilizers, bit, large tools, etc.).
3. Always assume any tight hole cleaning conditions are related to poor hole cleaning.
4. Sweeps may not be effective. Experience does show that sweeps will be relatively ineffective unless the density is 2 – 3 ppg over the active density and maximum pipe rotation is used when sweep exits bit.

## *Lost Circulation Recommendations for KlaShield*



# Section 4: Criteria for Contingency Additives

If additives needed for any of the mud systems described in this plan are not listed on the proposed interval mud summaries, they will not be used without first considering the following criteria:

1. Use an alternative product already on the proposed inventory and in stock that will have the same affect in the mud. As part of operating policy, products already in stock will be used before special shipments are arranged.
2. Characterize the nature of the additive to determine if it is relatively inert with respect to toxicity. For drilling operations and mud formulation in general, operating policy is based on past evaluations of mud/additive systems to consider the following as "relatively inert":
   - Mica (as needed)
   - Cellophane flakes (as needed)
   - Nut hulls (as needed)
   - Inert spheres (as needed)
   - SAPP (0.5 lb/bbl)
   - Calcium carbide (as needed)
   - Vegetable plus polymer fibers, flakes, granules (50 lb/bbl)
   - Zinc carbonate and lime (as needed)
   - Zinc oxide (as needed).

   These additives may be applied to mud as required to achieve specific mud characteristics and/or performance.
3. Discharge of any drilling product containing diesel oil or nonaqueous drilling fluids will not be allowed.

# Section 5: Drilling Fluid Program Roles, Reporting and Environmental Requirements

## 5.1 Roles & Responsibilities

### Mud Engineer

- Maintenance of drilling fluid inventories
- Ordering of mud products
- Generating daily mud reports
- Communicating daily with G&I personnel regarding operational issues
- Liaison with Drilling Foreman with both fluid and G&I issues
- Generating Injection Reports with assistance of G&I personnel
- Daily communication with Anchorage office

### G & I Supervisor

- Insure safe practices and policies are followed at all times
- Document weekly safety meetings and forward the document to Anchorage.
- Insure the G&I crew follow all platform rules and guidelines.
- Schedule and approve all G&I crew rotation
- Insure proper QA/QC for all slurries to be disposed of
- Insure annulus is monitored during each injection
- Work with the G&I crew and mud engineer to produce a Daily Activity Report
- Daily communication with Anchorage office

### Lead Operator

- Works at direction of Supervisor
- Responsible for actively grinding and pumping of slurry
- Monitors slurry to maintain proper parameters
- Directs operator duties

## 5.2 Reporting Requirements

### Daily Reports

- **Daily Mud Check Reports** produced by the Mud Engineer.(submitted to Drilling Foreman)
- **Daily Activity Reports** produced by G&I Supervisor.
- **Injection Reports** for each injection to be produced by the Mud Engineer.

### Monthly Injection Report

- To be compiled by the G&I Supervisor from each daily injection report and submitted no later than the first week of the following month.

### End of Well Report

- A complete drilling fluid and grind and inject summary will be compiled by the Mud Engineer along with the G&I Supervisor and submitted at the end of each well.

## 5.3 Health, Safety and Environmental Issues Related to Handling of Drilling Fluid Products

### Health and Safety

1. Drilling crews will be instructed in the proper procedures for handling fluid products.
2. Personal Protective Equipment (PPE) charts will be posted in the pit room, the mud lab, and the office of the Drilling Forman.
3. PPE must be in good working order and be utilized as recommended by the PPE charts.
4. Product additions should be made with the intent to use complete unit amounts of products (sacks, drums, cans), as much as possible in order to minimize inventory of partial units.
5. Insure all material safety data sheets (MSDS) sheets are up to date and readily available for workers to access for information.

### Environmental

1. Insure that all product stored outside is protected from the weather.
2. Do not store partial units (sacks) outside.
3. When transferring fluids and/or cuttings from the rig to tanks, insure all hoses are properly secured.

# TAB

## Attachment 3
## ENVIRONMENTAL MONITORING PLAN

# Environmental Monitoring Plan
## NPDES General Permit AKG-31-5022

2011 – 2016 EXPLORATION DRILLING PLAN

FURIE OPERATING ALASKA, LLC
KITCHEN LIGHTS UNIT

Kitchen Lights Unit #1
Kitchen Lights Unit #2
Kitchen Lights Unit #3
Kitchen Lights Unit #4
Kitchen Lights Unit #5

NORTH COOK INLET, ALASKA


Operator:

Furie Operating Alaska, LLC
1029 W. 3rd Avenue, Suite 500
Anchorage, AK 99501

**December 30, 2011**

# Table of Contents

# Glossary of Acronyms

| | |
|---|---|
| ASTM | American Society for Testing and Materials |
| ADEC | Alaska Department of Environmental Conservation |
| ADL | Alaska Division of Land |
| Ba | barium |
| ºC | degrees Celsius |
| Cd | cadmium |
| CFR | Code of Federal Regulations |
| CM/SEC | centimeters/second |
| COC | chemical of concern |
| Cr | chromium |
| CTD | Conductivity, Temperature and Depth |
| Cu | copper |
| DOT | U.S. Department of Transportation |
| EMP | Environmental Monitoring Plan |
| EPA | U.S. Environmental Protection Agency |
| Furie | Furie Operating Alaska, LLC |
| °F | degrees Fahrenheit |
| $ft^2$ | square foot |
| GPS | global positioning satellite |
| Hg | mercury |
| ug/kg | micrograms per kilogram |
| ug/L | micrograms per liter |
| mg/kg | milligrams per kilogram |
| ML | milliliter |
| MS | matrix spike |
| MSD | matrix spike duplicate |
| ND | not detected |
| NOI | notice of intent |
| NPDES | National Pollutant Discharge Elimination System |
| PAH | polynuclear aromatic hydrocarbon |
| Pb | Lead |
| ppb | parts per billion |
| QA/QC | quality assurance/quality control |
| QAPP | quality assurance project plan |
| SAP | Sampling and Analysis Plan |
| TKN | Total Kjehldahl nitrogen |
| t.05 | probable error rate of 5% |
| TOC | total organic content |
| TLC | teflon-lined screw |
| TLS | teflon-lined septa sonically bonded to screw |
| USC | Unified Soil Classification system |
| USGS | U.S. Geological Survey |
| Zn | zinc |

# Section 1: Introduction

Furie Operating Alaska, LLC (Furie) is providing this Notice of Intent (NOI) for continued coverage under NPDES General Permit AKG-31-5000 (*AKG-31-5022)* for oil and gas exploration drilling in State of Alaska coastal waters of the upper Cook Inlet. The purpose of the permit application will be to allow Furie continued authorization of discharges during drilling activities in coastal waters.

Drilling will be conducted by Spartan 151 jackup drill rig (Baker Marine Class 150 HC or smaller class) during ice-free months. Furie's initial plans for drilling activities in coastal waters include a five-year, five well exploration program. Depending on results, additional wells may be drilled (See Section 1.1).

*AKG-31-5022* allowed coverage for discharges from new oil and gas extraction facilities engaged in exploration activities under the Offshore and Coastal Subcategories of the Oil and Gas Extraction Point Source Category (*40 CFR Part 435, Subparts A and D*).

*AKG-31-5000* requires new exploratory facilities to submit a plan of study for environmental monitoring to EPA for review with, or prior to, submission of a NOI. The objective of the environmental study is to monitor the fates and effects of hydrocarbon and heavy metals in drilling muds and/or cuttings discharged to Cook Inlet. Monitoring must include relevant hydrographic, sediment hydrocarbon, and heavy metal data from surveys conducted before and during drilling mud disposal and up to a least one year after drilling operations cease.

This Environmental Monitoring Plan (EMP) has been prepared to describe technical specifications of the environmental monitoring study and related sampling activities to meet requirements of *AKG-31-5000*, Part II, Section B, Number 5 (*AKG-31-5000.II.B.5*). Furie provides this EMP to the U.S Environmental Protection Agency (EPA) in support of its NOI for continued use of NPDES General Permit *AKG-31-5022*, pursuant to *40 CFR Part 435, Subparts* A and D, and as outlined and prescribed by *AKG-31-5000*.

## 1.1 Contact and Summary Discharge Information (for Mobile Facility)

Furie may opt to drill more than four exploration wells; therefore, Furie is requesting continued permit coverage as a mobile facility, operating in the upper Cook Inlet area (see Letter of Intent Information Sheet for project description).

Additional information on the Spartan 151, facility contacts, and the latitude and longitude of the five exploration wells is contained in the Letter of Intent Information Sheet.

## 1.2 Plan Organization

This EMP is organized by Subparts as found in *AKG-31-5000.II.B.5.d*, and as described in the following sections.

Section 1: Introduction.
Section 2: Monitoring Objectives (*AKG-31-5000.II.B.5.d.i)* and Monitoring Criteria *(AKG-31-5000, II.B.1. Table 1).*
Section 3: Appropriate Null and Alternate Test Hypotheses (*AKG-31-5000.II.B.5.d.ii).*
Section 4: Statistically Valid Sampling Design (*AKG-31-5000.II.B.5.d.iii).*
Section 5: Monitoring Procedures and Methods (*AKG-31-5000.II.B.5.d.iv).*
Section 6: Quality Assurance/Quality Control Program (*AKG-31-5000.II.B.5.d.v).*
Section 7: Detailed Discussion of How Data will be used to Meet, Test and Evaluate the Monitoring Objectives (*AKG-31-5000.II.B.5.d.vi).*
Section 8: Summary of the Results of Previous Environmental Monitoring as they Apply to the Proposed Program Plan (*AKG-31-5000.II.B.5.d.vii).*

Additionally, this EMP includes the following project-related documents:

*Sampling and Analysis Plan (SAP)*–Appendix A.
*Quality Assurance Project Plan* (QAPP)–Appendix B.

This plan is subject to revision as the program proceeds, with revisions subject to EPA approval.

## Section 2: Monitoring Objectives (*AKG-31-5000.II.B.5.d.i*)

The environmental monitoring study has the following objectives.

- Monitor for discharge-related impacts.
- Determine if statistically significant changes in sediment pollutant concentrations and sediment toxicity occur with time and distance from the discharge of drilling fluids and mud-coated cuttings.
- Monitor for discharge related impacts to the benthic community.
- Assess whether any impacts warrant an adjustment of the monitoring program.
- Provide information for permit re-issuance.

These objectives will be achieved by collecting relevant hydrographic, sediment hydrocarbon, and heavy metal data from surveys conducted before and during drilling mud disposal and up to at least one year after drilling operations cease.

# Section 3: Appropriate Null and Alternate Test Hypotheses *(AKG-31-5000.II.B.5.d.ii)*

## 3.1 Establish Site-specific Baseline Data Prior to Null Test Hypotheses

No site-specific relevant background data for monitoring criteria (polynuclear aromatic hydrocarbons and metals) exist for comparison at any of the initial proposed well locations (see Section 6). Consequently, site-specific background (baseline) data at each well location must first be established by water column screening and benthic sediment sampling before drilling begins. This will be done by collecting a total of 9 water column samples and 16 benthic sediment samples at each well location to establish baseline concentrations.

This also may be done by collecting additional sediment samples on a well-by-well basis, after preliminary estimates of mean and standard deviation are obtained for each parameter from the initial samples.

## 3.2 Appropriate Null Test Hypotheses

By using standard deviation from the site specific baseline data (Section 3.1), it is estimated that fewer than 13 samples will be required per each subsequent monitoring event to demonstrate that the true mean concentrations of polynuclear aromatic hydrocarbons (PAHs) and metals from discharge during drilling and after drilling are within baseline concentrations.

This will be done by showing that an upper Confidence Interval is within baseline concentrations for each parameter at a probable error rate of 5% (t= 0.05) using the 1-tail “t” test.

The null hypothesis will be that concentrations are elevated during drilling monitoring or after drilling and are elevated above baseline concentrations:

$H_0$: $\geq$ 95$^{th}$ upper confidence limit of the mean local baseline concentrations

$H_1$: $\leq$ 95$^{th}$ upper confidence limit of the mean local baseline concentrations

The null hypothesis will be tested using estimates of the 95% confidence limits around the estimated mean of the local baseline data for PAHs and selected metals. The t-distribution (normal) will be assumed. Transformations of the data will be used to assure a reasonable approximation of a normal distribution, if necessary.

If the null hypothesis for each parameter is rejected in a sampling area, the rejection will confirm that PAH and metal concentrations are not elevated during drilling monitoring or after drilling, and are not elevated above baseline concentrations.

## 3.3 Appropriate Alternate Test Hypotheses

In the case the null is accepted, further data analysis and/or background benthic sediment sampling will be conducted to re-determine the 95$^{th}$ upper confidence limit of the mean of local background concentrations. This will be done by collecting additional random samples on a 100-meter centered grid located cross current. The sampling approach for re-determination is described in the SAP (Appendix A).

## Section 4: Statistically Valid Sampling Design *(AKG-31-5000.II.B.5.d.iii)*

Furie's sampling plan, methods and procedures are described in detail in Section 5 and in the SAP in Appendix A.

In summary, Furie has developed a sampling design that is statistically valid and technically defensible. Probability-based sampling with a statistical survey design will provide an unbiased estimate over a site-specific area from a small number of samples. This will be accomplished by completing the following general activities at each well location.

- Furie will perform hydrodynamic and hydrographic surveys and screening prior to each environmental monitoring event to confirm current directions, water column temperature, salinity, and turbidity. Screening for temperature, salinity, and turbidity will be done at three intervals within the water column at three locations during each monitoring event (See Section 5).

- To establish baseline data, Furie will collect a total of 16 benthic sediments samples (8 systematic samples and 8 random simple grid samples) once before drilling. As noted in Section 3.1, fewer than 13 samples will be required per each subsequent monitoring event to demonstrate that the true mean concentrations of PAHs and metals.

- For comparison to baseline data, Furie will again perform systematic sampling (same original 8 locations) and random simple grid sampling (8 new locations) once during drilling. This will occur specifically during discharge of water-based drilling fluids and drilling mud-coated cutting.

- For comparison to baseline and discharge data, Furie will again perform systematic sampling (same 8 locations) and random simple grid sampling (8 new locations) within one year after the rig has moved offsite. Based on conversations with the EPA and interpretation of *AKG-31-5000.II.B.5.d,* post drilling sampling and monitoring will take place no earlier than 1 year after drilling operations have been completed.

# Section 5: Monitoring Procedures and Methods *(AKG-31-5000.II.B.5.d.iv)*

## 5.1 Project Summary

Probability-based sampling with a statistical survey design will provide an unbiased estimate over a site-specific area from a small number of samples. This will be accomplished by completing the following general activities at each well location.

- Perform hydrodynamic and hydrographic surveys prior to each environmental monitoring event to confirm current direction, plus water column temperature, salinity and turbidity.
- Perform systematic and random simple grid sampling once before drilling to establish baseline data.
- Perform systematic sampling and random simple grid sampling once during drilling (specifically during discharge of water-based drilling fluids and mud-coated cutting) for comparison to baseline data. This sample may be in 2nd year of multi-year well.
- Perform systematic sampling and random sampling within one year after drilling, after the rig has moved offsite, for comparison to baseline and discharge data.

## 5.2 Hydrodynamic and Hydrographic Surveys: Each Monitoring Event

Hydrodynamic and hydrographic surveys will be performed before each benthic sediment sampling event. The survey will help confirm that systematic sampling is carried out in the areas most likely to be impacted by discharged drilling fluids and mud-coated cuttings. The surveys will include the following.

- Measuring and documenting current direction and speed by using an electromagnetic (or similar) current meter.
- Measuring tidal fluctuations by shipboard fathometer.
- Screening water column temperature, salinity and turbidity by a conductivity, temperature and depth (CTD) sampler at 3 locations (incoming tidal current direct, outgoing tidal current direction, and cross current) and at 3 intervals at each location (1 meter below the surface, halfway to the seafloor and about 2 meters above the seafloor).

## 5.3 Environmental Monitoring Survey: Once Before Drilling

An example of the “Once Before Drilling” environmental monitoring sampling program is depicted in Figure 2; sampling is further described below.

### 5.3.1 General Program

Site-specific background (baseline) data at each well location will first be established before drilling by collecting a total of 16 benthic sediment samples. This includes systematic sampling (at 8 sample locations based on current vectors) and simple random grid sampling (at 8 sample locations based on a sampling grid with 100-meter centers).

- **Systematic Sampling.** Currents at all well locations are tidal in nature. Therefore, systematic benthic sediment samples will be collected at 100-meter increments from each well location parallel to both current directions. After the hydrographic/ hydrodynamic survey, this will be accomplished by:

    1. Collecting 4 benthic samples during slack tide at 100-meter intervals along the outgoing tidal current vector. This will ensure sediment is sampled down current of the discharge in the area most likely to be impacted.

    2. Collecting 4 benthic samples also during slack tide at 100-meter intervals along the incoming tidal current vector. This will ensure sediment is sampled down current of the discharge in the other area most likely to be impacted.

- **Simple Random Grid Sampling (100-meter Grid Centers).** To further develop a statistically valid, robust sample population for comparison, another 8 samples also will be collected by random sampling of a grid with 100-meter grid centers surrounding the well location. Random sampling will be accomplished by numbering each grid center, selecting grid numbers by random number generator, and then locating these center points by coordinates for sampling.

### 5.3.2 Additional Sampling to Determine if the Range of Respective Values are Representative

During baseline monitoring, Furie may opt to collect additional samples based on the following conditions.

- **Resample if Variation Coefficient is <51%.** With a smaller sample size used for baseline data comparison, the coefficient of variation is expected to be slightly larger that 51%. Therefore, if the coefficient of variation for the local background level is <51%, Furie may opt to resample local background to determine if the ranges of values are actually representative. In determining to resample, the number of results below detection limits, the full range of values, and the coefficient of variation will be considered.

- **Collect Additional Samples after Reviewing Mean and Standard Deviation.** Furie also may opt to collect additional baseline benthic sediment sample at each well location after preliminary estimates of mean average and standard deviation are obtained for each parameter. This will be done by again using simple random grid sampling to select another three sample locations.

## 5.4 Environmental Monitoring Surveys: Once During and Once After Drilling

### 5.4.1 General Program

Sediment sampling during drilling will take place during discharge of water-based drilling fluids and drill mud-coated cuttings. Sediment sampling after drilling will take place no later than one year after drilling operations are completed.

1. Determine current and collect 1 cross current water column sample
2. Collect 2 co-located water column and systematic sediment samples: 1 on incoming current and 1 on outgoing current
3. Collect another 3 sediment samples along outgoing current direction
4. Collect another 3 sediment along incoming current direction
5. Collect 8 random samples from grid at 100-meter grid centers

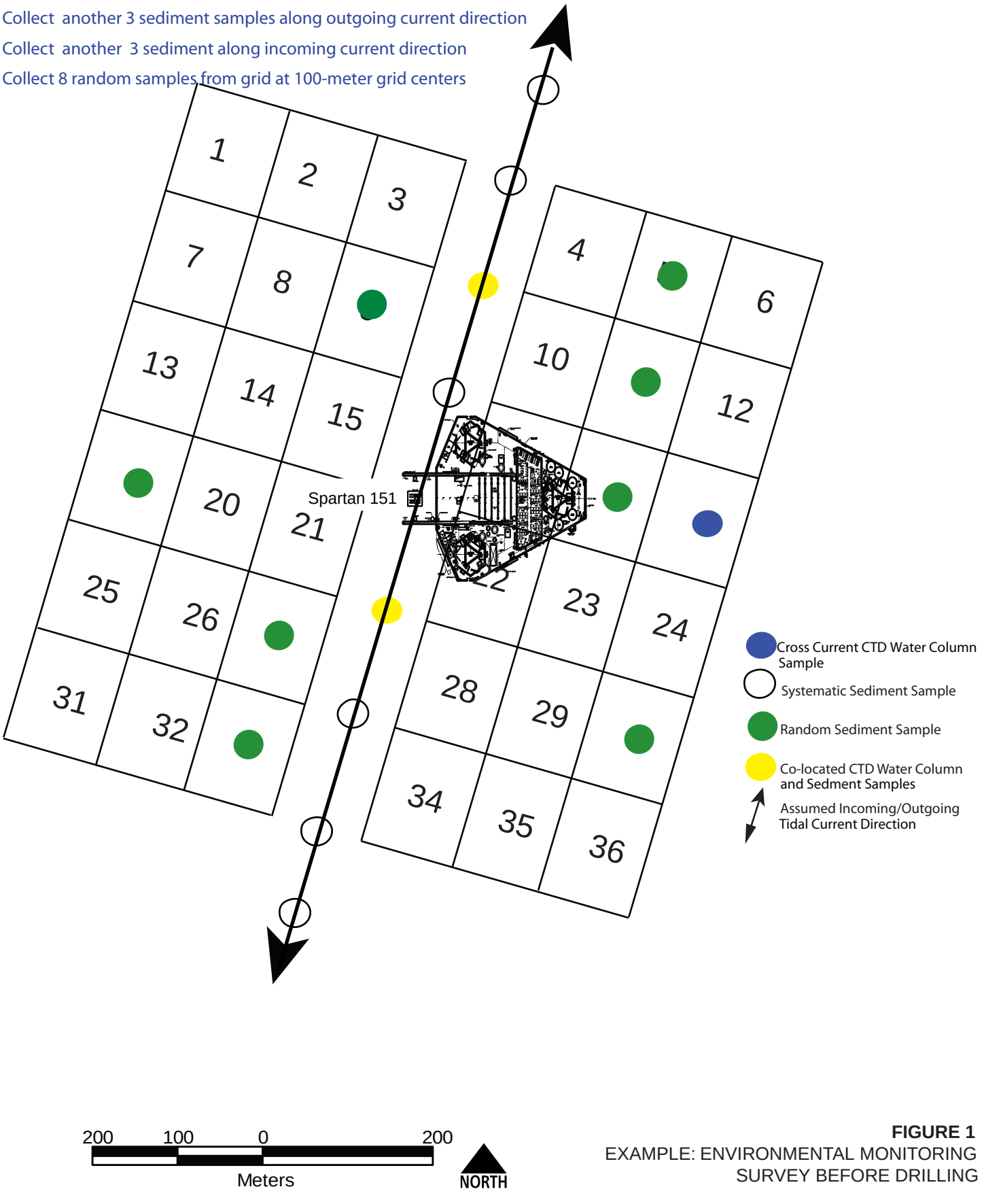



**FIGURE 1**
EXAMPLE: ENVIRONMENTAL MONITORING SURVEY BEFORE DRILLING

By using standard deviation from the site specific baseline data, it is estimated that only six samples will be required, per monitoring event, to provide statistically valid results for comparison. For consistency, however, 16 samples will be collected once during drilling and another 16 samples will be collected after drilling by again using systematic sampling and simple random grid sampling.

- **Systematic Sampling.** Systematic sampling during and after drilling will again be based on current vectors. After the hydrographic/hydrodynamic survey for each of event is completed, this will be accomplished by the following.

    1. Collecting 4 benthic samples during slack tide at 100-meter intervals along the outgoing tidal current vector.

    2. Collecting 4 benthic samples also during slack tide at 100-meter intervals along the incoming tidal current vector.

- **Simple Random Grid Sampling (100-meter Grid).** To further develop a statistically valid, robust sample population for comparison, another 8 samples also will be collected during each of these monitoring events by random sampling of a similar-sized 100-meter grid, using the same methods to establish the grid and select sampling points.

### 5.4.2 Additional Sampling to Determine if the Range of Values are Representative

Furie may resample or collect additional samples after reviewing coefficient of variation, mean and standard deviation results. Again, samples will be collected via random grid sampling.

## 5.5 Monitoring Criteria

Proposed monitoring criteria will reflect monitoring requirements as listed in *AKG-31-5000, II.B.5.d* and in *AKG-31-5000, II.B.1.Table 1*. Therefore, the following site-specific environmental monitoring criteria are proposed.

- Hydrodynamic conditions as characterized by current direction and speed to help establish sediment sampling locations.

- Hydrographic conditions as characterized by temperature, salinity and turbidity.

- Sediment geotechnical conditions as characterized by sediment average grain size.

- Sediment geochemical conditions as characterized by analysis for polynuclear aromatic hydrocarbons (PAHs), and total metals analysis for barium (Ba), cadmium (Cd), chromium (Cr), copper (Cu), mercury (Hg), zinc (Zn), and lead (Pb).

## 5.6 Monitoring Methods and Procedures

### 5.6.1 Surveying and Logging

Water column and sediment sampling locations will be mapped and referenced based on surface location of the sampling vessel, using global positioning satellite (GPS) imagery and coordinates. All soils will be logged by using the Unified Soil Classification System as outlined in American Society for Testing and Materials (ASTM) D2400.

### 5.6.2 Hydrographic and Hydrodynamic Survey

*CTD Sampler (photo from ADEC Water Quality Assessment and Monitoring Program)*

Environmental monitoring surveys will be carried out by vessel and usually at the same time as geohazard surveys required by the Alaska Oil and Gas Conservation Commission (AOGCC).

The hydrodynamic survey includes collecting information on current direction/speed by using an electromagnetic (or similar) current meter and information on tidal fluctuations by shipboard fathometer.

Hydrographic studies will focus on water column temperature, salinity and turbidity by CTD sampler. The CTD and turbidity sensors are attached to a cage-like apparatus called a rosette (right). The rosette is heavy so that it will sink to the seafloor if required, while protecting the instruments if the rosette bangs against rocks and/or drags along the bottom.

As noted, during each monitoring/sampling event, water column sampling by CTD will be done at 3 locations (incoming tidal current direct, outgoing tidal current direction, and cross current), and at 3 intervals at each location (1 meter below the surface, halfway to the seafloor and about 2 meters above the seafloor).

### 5.6.3 Benthic Sediment Sampling

*Van Veen grab sampler (photo from 2002 Alaska EMAP report)*

Benthic sediment samples will be collected at slack tide, by either a single or double Van Veen grab sampler. The jaws of the grab are set open like a trap, and when the grab sampler hits bottom, the trap snaps shut, capturing the sediment sample.

The grab sample will be composited before filling the sample containers, and then submitted for offsite geochemical analysis for PAHs and select metals. Analyses for total recoverable concentrations shall be conducted and reported for each metal utilizing the methods specified in *40 CFR Part 136*. The results shall be reported in “mg/kg of whole mud (dry weight)” and the moisture content (percent by weight) of the original drilling mud sample also will be reported.

## Section 6: Quality Assurance/Quality Control Program *(AKG-31-5000.II.B.5.d.v)*

Water column screening and sediment sampling for this project will be conducted in accordance with EPA guidelines for QA/QC described in the QAPP (Appendix B).

Sample replicates (duplicates) are included in the sampling program and will be collected at a 1-to-10 ratio. One equipment (rinsate) blank will be collected per site or per day and sent to the offsite laboratory.

## Section 7: Detailed Discussion of How Data will be used to Meet, Test and Evaluate the Monitoring Objectives (*AKG-31-5000.II.B.5.d.vi*)

Upon completion of post-drilling monitoring, Furie will analyze the data and submit a draft report within 180 days following the completion of sample collection.

The report will address the environmental monitoring objectives by using appropriate descriptive and analytical methods to test for and to describe any impacts of the effluent on sediment pollutant concentrations, sediment quality, water quality and/or the benthic community.

The report will include all relevant QA/QC information on instrumentation, laboratory procedures, detection limits and sample collection methodology. This will be presented in an attached QA/QC data validation report.

## Section 8: Summary of the Results of Previous Environmental Monitoring as they Apply to the Proposed Program Plan *(AKG-31-5000.II.B.5.d.vii)*

Results of previous environmental monitoring studies possibly applicable to the proposed program plan must include data from sampling for sediment hydrocarbons and heavy metals in Cook Inlet (especially if related to the oil and gas industry), plus hydrographic and sediment characteristics.

Available applicable regional sampling surveys reports are referenced and listed in Table 1, along with objectives, results and conclusions. Site-specific information is not available for the four initial well locations.

**Table 1: Applicable Previous Environmental Monitoring Studies**

| Objectives and Study Design | Results and Conclusions |
|---|---|
| ***AK MAP Alaska Monitoring and Assessment Program: The Condition of Southcentral Alaska's Bays and Estuaries Technical Report and Statistics Summary*** **(Alaska Department of Environmental Conservation [ADEC], March 15, 2006)** | |
| Probability-based sampling with a statistical survey design to:<br>• Provide an unbiased estimate over a large geographic area from a small number of samples.<br>• Estimate geographic extent, current status, trends and changes in selected Alaska aquatic ecological resources indicators on a regional and statewide basis with known statistical confidence.<br>• Seek to establish associations between selected indicators of natural and anthropogenic stresses and condition of aquatic ecological resources. | **Sediment Characteristics**<br>Visual indicators suggest sandy sediments (<20% silt+clay) accumulate in upper Cook Inlet and "muddy" sediments (>80% silt+clay) accumulate in lower Cook Inlet. Plus, there was no statistically significant correlation between % silt+clay and total organic content (TOC).<br>**Geochemical Results**<br>• Sediment grain size and associated organic matter strongly influence the extent of contamination.<br>• Total cadmium (Cd) and Total mercury (Hg) in sediment ranged from not detected (ND) in upper Cook Inlet to 0.4 ug/g Cd and 0.005 ug/g Hg in lower Cook Inlet.<br>• Chinitna Bay (westside of Cook Inlet) contained the highest PAH concentrations; source was determined to be natural oil seeps (within the bay watershed, and several other locations on the westside) and not downstream transport of dissolved/particulate oil from upper Cook Inlet oil industry operations.<br>• PAHs received contributions from coal, pyrogenic, petrogenic, and biogenic sources. Additionally, these PAHs are not weathering in transit, are enclosed within a stable matrix (oil shale particulates), and do not appear to be bioavailable. |
| ***Technical Evaluation of the Environmental Monitoring Program (EMP) for Cook Inlet Regional Citizens Advisory Council*** **(Littoral Ecological and Environmental Services. January 23, 1999)** | |
| 1993-1997 EMP sampling was designed to:<br>• Detect if contaminants contained in permitted discharges from the oil industry were accumulating in inlet and if they were affecting organisms at various trophic levels.<br>• Collect subtidal samples from areas of potential deposition and attempt to determine if sediment sorbed contaminants are accumulating downstream of oil industry operations. | **Geochemical Results**<br>• Sediment samples exhibit extremely low levels of PAH (40-50 times below NOAA ERL concentrations), and do not contain adequate hydrocarbon concentrations to cause mortality or sublethal effects to exposed organisms.<br>• The PAH sources are varied and mixed, but they cannot be directly attributed to Cook Inlet oil and gas development operations. |

| Objectives and Study Design | Results and Conclusions |
|---|---|
| ***Final Report for CIRCAC Intertidal Reconnaissance Survey in Upper Cook Inlet*** (**Littoral Ecological and Environmental Services. September 10, 2001)** | |
| An intertidal reconnaissance was conducted at 24 sites in the upper inlet, including Middle Ground Shoal, to:<br>• Determine if oil industry operations in Cook Inlet are having adverse effects on the surrounding ecosystem.<br>• If impacts detected, document the sources and magnitude of the impacts and spatial and temporal trends.<br>• Provide descriptions of particle grain size and TOC.<br>• Analyze sediment samples for analysis of (PAHs) and aliphatic hydrocarbons. | **Sediment Characteristics**<br>• Westside of Cook Inlet sediments included average 0.113 mm grain size, 0.449 % TOC and 0.032% Total Kjehldahl nitrogen (TKN).<br>• Middle Cook Inlet sediments included average 0.22 mm mean grain; 0.155% TOC and 0.01% TKN<br>• Cook Inlet Eastside: 0.176 mm grain, 0.427 %TOC and 0.03 % TKN<br>• Coarser grains in the middle inlet were influenced by the degree of exposure to wave action and currents. In contrast, the westside received heavy loads of fine, suspended sediments from glacier-fed rivers.<br>• Both TOC and TKN are lower in the middle Inlet, meaning it is impoverished in organic nutrients and Cook Inlet is an oligotrophic estuary.<br>• Both particle grain size and hydrodynamic activity are negatively correlated with organic matter as measured by TOC and TKN.<br>**Geochemical Results**<br>• In general, the intertidal sediments were extremely clean, ranging from <1.5 ppb PAH at South Shoal to 80 ppb PAH at Moose Point.<br>• Evidence of petroleum hydrocarbon contamination in all intertidal sediments was absent; occasionally PAHs from combustion products were detected.<br>• Aliphatic hydrocarbons found at low method detection limits and were generally believed to be of biogenic origin.<br>• Traces of PAH derived from eroding peat were frequently encountered, and occasionally evidence of coal was detected.<br>**Hydrodynamic Characteristics**<br>• Maximum current velocity ranged up to 7 knots during ebbing spring tides near Middle Ground Shoal and East Foreland; strong currents on both flood and ebb tides depress the ability of macroinfauna to establish and survive in sediments. |

# TAB

## EMP Appendix A
## Sampling and Analysis Plan

# Sampling and Analysis Plan
## NPDES General Permit AKG-31-5022

2011 – 2016 EXPLORATION DRILLING PLAN

FURIE OPERATING ALASKA, LLC
KITCHEN LIGHTS UNIT

Kitchen Lights Unit #1
Kitchen Lights Unit #2
Kitchen Lights Unit #3
Kitchen Lights Unit #4
Kitchen Lights Unit #5

NORTH COOK INLET, ALASKA


Operator:

FURIE
Operating Alaska LLC

Furie Operating Alaska, LLC
1029 W. 3rd Avenue, Suite 500
Anchorage, AK 99501

**December 30, 2011**

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# Glossary of Acronyms

| | |
|---|---|
| ASTM | American Society for Testing and Materials |
| Ba | barium |
| ºC | degrees Celsius |
| Cd | cadmium |
| CFR | *Code of Federal Regulations* |
| CM/SEC | centimeters/second |
| COC | chemical of concern |
| Cr | chromium |
| CTD | Conductivity, Temperature and Depth |
| Cu | copper |
| EPA | U.S. Environmental Protection Agency |
| °F | degrees Fahrenheit |
| $ft^2$ | square foot |
| GPS | global positioning satellite |
| Hg | mercury |
| ug/kg | micrograms per kilogram |
| ug/L | micrograms per liter |
| mg/kg | milligrams per kilogram |
| ML | milliliter |
| MS | matrix spike |
| MSD | matrix spike duplicate |
| NOI | Notice of Intent |
| NPDES | National Pollutant Discharge Elimination System |
| PAH | polynuclear aromatic hydrocarbon |
| Pb | lead |
| QA/QC | quality assurance/quality control |
| QAPP | quality assurance program plan |
| RPD | relative percent difference |
| SAP | Sampling and Analysis Plan |
| SW-846 | *EPA Publication SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* |
| TLC | teflon-lined screw |
| TLS | teflon-lined septa sonically bonded to screw |
| TSS | Total Survey Station |
| USC | Unified Soil Classification system |
| USGS | U.S. Geological Survey |
| Zn | Zinc |

# Section 1: Introduction

Furie Operating Alaska, LLC (Furie) has developed this appended sampling and analysis plan (SAP) to help satisfy environmental monitoring requirements for seeking coverage under National Pollutant Discharge Elimination System (NPDES) *General Permit AKG-31-5000.*

Specifically, this plan has been prepared to help guide three environmental monitoring surveys (before drilling, during drilling and after drilling) at each well location. The objective of the environmental monitoring is to first establish baseline water column and benthic sediment conditions and then compare them to conditions found during drilling and found after drilling.

## 1.1 Project Overview

### 1.1.1 Scope of Work

The following general activities will be carried out at each well location to fulfill *AKG-31-5000, II.5.e* environmental monitoring requirements, and renewal of coverage under AKG-31-5022.

- Before drilling, rerform a hydrographic survey to confirm tidal current direction; and also perform systematic and random simple grid sampling to establish baseline conditions.
- During drilling (specifically during the discharge of water-based drilling fluids and mud-coated cuttings), perform a hydrographic survey systematic, and also perform random simple grid sampling for comparison to baseline conditions. May be in year 2 of multiple-season wells.
- After drilling (and within one year) perform a hydrographic survey, and also perform systematic and random simple grid sampling once after rig has moved offsite for comparison to baseline and discharge conditions.

### 1.1.2 SAP Objectives

As noted in the environmental monitoring plan (EMP), Furie proposes to conduct the environmental monitoring surveys with the objective of being able to compare baseline conditions to those found during and after drilling to help determine if the discharge of water-based drilling fluids and mud-coated cuttings impact the immediate area around each well location.

The SAP will help achieve these goals by presenting guidelines for a water column and benthic sediment sampling programs consistent with state and federal sampling policies and procedures This plan also will help produce technically defensible data from samples collected and to support the statistical analysis of the sampling parameters.

## 1.2 Project Schedule

The jackup drilling rig, Spartan 151, arrived in upper Cook Inlet waters in August 2011. This was after the necessary permits and approvals were secured, site clearances were approved, and initial environmental monitoring/sediment sampling was concluded.

Furie proposes to operate the Spartan 151 during open-water drilling months over five seasons. At the end of the first drilling season, the jackup rig will be moved to an approved anchorage in south Cook Inlet waters for winter storage and/or used by other operators for their exploration

needs. If the Spartan 151 is not used by other industry in the winter seasons, it will be stored in a warm stack mode at an approved anchorage or dockside location yet to be determined.

Including environmental monitoring and geohazard presurveys, the Furie drilling operations are expected to take place over a period of about five years beginning in August 2011. The proposed project schedule for the multi-year exploration is as follows:

**2010 - 2011 (completed)**

- Complete initial environmental monitoring presurveys for all proposed wells, and detailed site clearance and pre-drilling geohazard surveys for the exploratory well locations. (KLU #1, KLU #2, KLU #3, KLU #4, KLU #5)

**2011 - 2012**

- Spartan 151 arrived in upper Cook Inlet in late August 2011 to drill and test the Sterling, Beluga, Tyonek Hemlock and Jurassic formations, approximately 16,500' depth.
- Rig up and drill KLU #1 from August 12 through November 15, 2011 to a depth of 8,805'.
- Conduct environmental monitoring survey during drilling of KLU #1.
- Rig down and move to winter storage, warm-stack rig until March 2012.
- Rig up and complete drilling and evaluating KLU #1 from approximately April 15 through July 1, 2012 to a depth of 16,500' +/-.
- Conduct environmental monitoring survey during drilling of KLU #1.
- Rig down and move to KLU #2 (or other) location.
- Rig up and drill KLU #2 from July 10 through November 15, 2011 (depth to be determined).
- Conduct environmental monitoring survey during drilling of KLU #2.
- Rig down and move to winter storage, warm-stack rig until March 2012.

**Subsequent Years**

- Move Spartan 151 from lower Cook Inlet in April to new well sites.
- Rig up and drill/complete/test wells from April 15 through November 15, each year.
- Conduct environmental monitoring survey during drilling and then conduct post environmental survey for each well during same survey.
- Rig down and release the Spartan 151 after completing wells.
- Conduct post environmental monitoring surveys at each well location during summer of each following year.

# Section 2: Project Organization and Responsibilities

## 2.1 Project Organization and Responsibilities

The project team and related responsibilities for completing environmental surveys are described below in Table A-1. All teams are responsible for complying with the EMP and this SAP, and for providing qualified team members.

**Table A-1: Project Team and Responsibilities**

| Project Team | Responsibilities |
|---|---|
| **Watson Alaska Inc.**<br>Anchorage, AK<br>(907) 278-5352<br>watson@alaska.net | Watson will be responsible for carrying out the geohazard surveys/site clearances, and supporting Furie in accomplishing environmental monitoring surveys. |
| **Escopeta Oil Company, LLC**<br>Bruce Webb, Vice President<br>(907) 277-3726<br>bruce@webbpetro.com | Furie's onsite representative and also as the primary point of contact with regulatory agencies for the survey. Furie will contract for screening and sampling results to provide guidence to Furie on the adequacy of data from environmental monitoring efforts. |
| **Jacobs Engineering**<br>Terry Heikkila, AK Op's. Manager<br>(907) 563-3322<br>Terry.Heikkila@jacobs.com | Jacobs will be responsible for carrying out the environmental monitoring surveys. |

## 2.2 Specialized Contractor Services

**Laboratory Services and Specialized Field Equipment.** SGS Alaska, Inc. may provide offsite analysis of petroleum hydrocarbons and metals (other qualified laboratories are available).

**Transportation, Logistics, and Communications.** Transportation may be via barge (yet to be contracted) and/or fishing vessel. Logistics will be carried out by Furie, Beacon Occupational Health and Safety Services (HSE Managers), and Jacobs Engineering as part of their services, and communications will be primarily by satellite and cellular telephones.

# Section 3: Environmental Monitoring Sampling Plan

Furie's proposed environmental monitoring sampling reflects guidance established and described in the following.

- *Guidelines Establishing Test Procedures for the Analysis of Pollutants* (40 CFR Part 136).
- *Inorganic and Organic Chemical Sampling and Analytical Requirements (40 CFR Parts 141.23 and 141.24).*
- *QAPP (Appendix B).*

Therefore, Furie's sampling program meets the requirements of *AKG-31-5000.II.B.5.d, AKG-31-5000.II.B.1.Table 1 and AKG-31-5000.II.B.4.e.*

## 3.1 Sample Numbers, Types and Locations

Sample numbers, types and analytical methods are summarized by event in Table A-2. Additional sediment samples will be collected if required. Sampling locations will be surveyed by global positioning satellite (GPS) tied into US Geological Service survey control monuments.

**Table A-2: Summary of Field Screening and Offsite Laboratory Samples**

| | Field Screening | Geochemical Analysis | | |
|---|---|---|---|---|
| | Temp, Salinity, Turbidity | Total Ba, Cd,Cr, Cu, Pb & Zn (EPA 6020) | Total Hg (EPA 7471A) | PAHs (EPA 8270) |
| **Environmental Monitoring Survey Once BEFORE Drilling** | | | | |
| Cross Current Water Column Sampling | 3 (at 1 location see note below) | | | |
| Co-located Water Column and Systematic Sediment Sampling | 6 (at 2 locations see note below) | 2 | 2 | 2 |
| Systematic Sediment Sampling | - | 6 | 6 | 6 |
| Simple Random Grid Sediment Sampling | - | 8 | 8 | 8 |
| QA/QC Field Duplicates | - | 2 | 2 | 2 |
| QA/QC Rinsate Blanks | - | 1 | 1 | 1 |
| **Environmental Monitoring Survey Once DURING Drilling (in year one or year two of multi-year well)** | | | | |
| Cross Current Water Column Sampling | 3 (at 1 location see note below) | | | |
| Co-located Water Column and Systematic Sediment Sampling | 6 (2 locations see note below) | 2 | 2 | 2 |
| Systematic Sediment Sampling | - | 6 | 6 | 6 |
| Simple Random Grid Sediment Sampling | - | 8 | 8 | 8 |
| QA/QC Field Duplicates | - | 2 | 2 | 2 |
| QA/QC Rinsate Blanks | - | 1 | 1 | 1 |

| Table A-2: Summary of Field Screening and Offsite Laboratory Samples *(continued)* | | | | |
|---|---|---|---|---|
| | **Field Screening** | **Geochemical Analysis** | | |
| | **Temp, Salinity, Turbidity** | **Total Ba, Cd,Cr, Cu, Pb & Zn (EPA 6020)** | **Total Hg (EPA 7471A)** | **PAHs (EPA 8270)** |
| **Environmental Monitoring Survey AFTER Drilling (NO EARLIER THAN 1 YEAR AFTER DRILLING OPERATIONS CEASE)** | | | | |
| Cross Current Water Column Sampling | 3 (at 1 location see note below) | | | |
| Co-located Water Column and Systematic Sediment Sampling | 6 (at 2 locations see note below) | 2 | 2 | 2 |
| Systematic Sediment Sampling | - | 6 | 6 | 6 |
| Simple Random Grid Sediment Sampling | - | 8 | 8 | 8 |
| QA/QC Field Duplicates | - | 2 | 2 | 2 |
| QA/QC Rinsate Blanks | - | 1 | 1 | 1 |

**Notes:**
Ba = Barium,
Cd = Cadmium
Cr = Chromium
Cu = Copper
Hg = Mercury
Pb = Lead
Zn = Zinc

PAHs = polynuclear aromatic hydrocarbons
EPA = U.S. Environmental Protection Agency

At each location, water column screening for salinity, turbidity and temperature will be collected from 3 intervals: 1 meter below the surface, halfway to the seafloor and about 2 meters above the seafloor

## 3.2 Sampling Rationale and Strategy

All sampling conforms to the methods and calculations for systematic sampling and simple random grid sampling contained in *An Overview of Methods for Evaluating the Attainment of Cleanup Standards for Soils, Solid Media, and Groundwater* EPA Volumes *1, 2 and 3* (EPA, January 1996) as reflective of comparison to background/baseline sampling results.

**Systematic sampling** parallel to the same tidal current directions before, during and after drilling will provide direct results for comparison to baseline data to help determine statistically significant changes in sediment pollutant concentrations and toxicity with time (before/during/after) and distance (100 to 600 meters) from the discharge.

**Simple random grid sampling** will provide a more robust statistical population, thereby improving validity, and also act as “insurance” in case current directions changes dramatically with time.

Geochemical analysis conforms to *EPA Publication SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (*EPA 1996). SW-846 is a multi-volume document that changes over time as new information and data are developed. It has been issued by EPA since 1980 and is currently in its third edition. SW-846 functions primarily as a guidance document setting forth acceptable, although not required, methods for the regulated and regulatory communities to use in responding to RCRA-related sampling and analysis requirements.

# Section 4: Sample Handling

## 4.1 Sample Handling

Sample preservation and holding times are detailed in Table A-3.

**Table A-3: Sample Containers and Holding Conditions**

| Parameter | Matrix (Soil or Liquid) | Method[a] | Volume of Container | Container Description | Maximum Holding (Time)[b] | Preservative |
|---|---|---|---|---|---|---|
| PAHs | Soil | EPA 8310 | One 4 oz | Amber glass w/TLS | 14 days to extract 40 days to analysis | 4°C ± 2°C |
| Total Ba, Cd, Cr, Cu, Pb, and Zn | Soil | EPA 6010, 6020, 7130,7130A | One 4 oz | Amber glass w/TLC | 6 months to extract and analysis | 4°C ± 2°C |
| Total Hg | Soil | EPA 7471A | One 4 oz | Amber glass w/TLC | 6 months to extract and analysis | 4°C ± 2°C |

[a]*Test Methods for Evaluating Solid Waste,* SW-846, 3nd ed., revised April 1985; 3rd ed., September 1986.
[b]Maximum holding times are from dates of sample collection. All glass containers are glass jars unless otherwise noted.

**Notes:**
Ba = Barium,
Cd = Cadmium
Cr = Chromium
Cu = Copper
Hg = Mercury
Pb = Lead
Zn = Zinc
EPA = U.S. Environmental Protection Agency
PAHs = polynuclear aromatic hydrocarbons
TLC = Teflon-lined screw
TLS = Teflon-lined septa sonically bonded to screw

### 4.1.1 Sample Containers

The volumes and containers required for sampling activities are included in Table A-3. Pre-washed sample containers will be obtained from an EPA-approved source that prepares containers in accordance with EPA bottle washing procedures. All sample containers will be maintained under chain-of-custody procedures from the time of receipt to the time of sample analyses.

### 4.1.2 Sample Packaging

Samples will be packaged carefully to avoid breakage or contamination and will be shipped to the laboratory at proper temperatures. The following sample packaging requirements will be followed.

- Sample bottle lids will not be mixed; all sample lids will remain with the original containers.
- Each sample bottle will be placed in a separate, locking plastic bag to minimize the potential for contamination.
- Shipping coolers will be partially filled with packing materials to prevent the bottles from moving during shipment.
- The sample bottles will be placed in the cooler in a manner that ensures they do not touch one another.

- The environmental samples will be cooled. (Ice will not be used as a substitute for packing materials).
- Any remaining space in the cooler will be filled with inert packing material. Under no circumstances will material such as sawdust or sand be used.
- A custody record will be placed in a plastic bag and taped to the inside of the cooler lid. Custody seals will be affixed to the sample cooler and covered with strapping tape.

### 4.1.3 Marking and Labeling

- The use of abbreviations will be minimized.
- The words “This End Up” or “This Side Up” will be clearly printed on the top of the outer package. Upward pointing arrows will be placed on the sides of the package.
- After a cooler or container has been sealed, two chain-of-custody seals will be placed on the container, one on the front and one on the back. The seals will be protected from accidental damage by placing strapping tape over them.

## 4.2 Sample Custody

This section describes standard operating procedures for sample identification and chain of custody. The purpose of these procedures is to ensure that the integrity of the samples is maintained during collection, transportation, storage, and analysis. All chain-of-custody requirements comply with standard operating procedures indicated in EPA sample handling protocol.

Sample identification documents will be carefully prepared so that sample identification and chain of custody are maintained and sample disposition controlled. Sample identification documents include field notebooks, sample labels, custody seals, and chain-of-custody records.

### 4.2.1 Chain of Custody

The primary objective of the chain-of-custody procedures is to provide an accurate written record that can be used to trace the possession and handling of a sample from the moment of collection through analysis. A sample is in custody if it meets one of the following conditions:

- In an authorized person’s physical possession
- In an authorized person’s view
- Locked-up
- Kept in a secured area that is restricted to authorized personnel

### 4.2.2 Field Custody Procedures

Field personnel will use the following procedures:

- Few people as possible will handle samples.
- The sample collector will be personally responsible for the care and custody of samples collected until they are transferred to the field laboratory chemist for field analysis or dispatched properly under chain-of-custody protocol.
- The sample collector will record sample data (time of collection, sample number, analytical requirements, and matrix) in the field notebook.

- The field manager will determine whether proper custody procedures were followed during fieldwork and decide whether additional samples are required.

### 4.2.3 Chain-of-Custody Record

The chain-of-custody record will be fully completed in duplicate. In addition, if samples are known to require rapid turnaround in the laboratory because of project time constraints or analytical concerns (such as extraction time or sample retention period limitations), the person completing the chain-of-custody record will note these constraints in the “Remarks” section of the custody record.

### 4.2.4 Transfer of Custody, Shipment and Laboratory Custody Procedures

The following procedures will be used for transfer of sample custody and shipment:

- A chain-of-custody record will accompany the coolers in which the samples are packed. When transferring samples, the individuals relinquishing and receiving them will sign, date, and note the time on the record. This record documents sample-custody transfer.
- Samples will be dispatched to the laboratory for analysis with a separate chain-of-custody record accompanying each shipment. Shipping containers will be sealed with custody seals for shipment to the laboratory. The method of shipment, name of courier, and other pertinent information will be entered in the “Remarks” section of the chain-of-custody record.
- The chain-of-custody record identifying the contents will accompany all shipments.

A designated laboratory sample custodian will accept custody of the shipped samples and verify that the sample identification number matches the chain-of-custody record. Pertinent information about shipment, pickup, and courier will be entered in the “Remarks” section. The custodian will then enter sample identification number data into a bound logbook arranged by project code and station number.

### 4.2.5 Custody Seals

Custody seals are preprinted adhesive-backed seals with security slots designed to break if the seals are disturbed. Sample shipping containers will be sealed in as many places as necessary to ensure security. Seals will be signed and dated at the time of use. On receipt at the laboratory, the custodian will check (and certify by completing logbook entries) that seals on the shipping containers are intact. Strapping tape will be placed over the seals to ensure that seals are not accidentally broken during shipment.

## 4.3 Sample Documentation

### 4.3.1 Sample Identification

Samples will be minimally identified by the first nine parts of the following sample identification system. Samples requiring multiple analyses and/or multiple containers will use a single number for all containers. The sample identification system is shown in Table A-4.

- Samples sent to the laboratory are not to be renumbered.
- Trip blanks and equipment blanks do not need the final two digits. The blanks shall be numbered sequentially for each station for each year.

| Table A-4: Sample Identification Information | | |
|---|---|---|
| **Group Digits** | **Description** | **Code Examples** |
| 1-6 | Well identification (e.g., Corsair #1) | C |
| 7-8 | Sample event: | |
| | Before Drilling | BD |
| | During Drilling | DD |
| | After Drilling | AD |
| 9-10 | Calendar year: | 08 |
| 10-11 | Sample type: | |
| | Systematic Sediment | SS |
| | Random Grid | RG |
| | Equipment (rinsate) blank | EB |
| | Trip blank | TB |
| 9-11 | Sample station: | |
| 12-13 | Sample Number | 01 |
| 14 | Number/Letter Identifiers for blind duplicate | A |

Examples of sample identification numbers are described below:

- **CBD08SS01**
  Where: C = Corsair #1
  Sample Event: BD = Sample collected before drilling
  When: 08 = Sample collected in 2008
  Sample type: SS = Systematic sediment sample
  Sample number: 01 = The first sample from that well location

- **CBD08SS01A**
  Where: C = Corsair #1
  Sample Event: BD = Sample collected before drilling
  When: 08 = Sample collected in 2008
  Sample type: SS = Systematic sediment sample
  Sample number: 01A = Blind duplicate of first sample from that location

### 4.3.2 Daily Logs

Daily logs and data forms are necessary to provide sufficient data and observations to enable participants to reconstruct events that took place during the project and to refresh the memory of the field personnel if called upon to give testimony during legal proceedings. All daily logs will be kept in a bound, waterproof logbook containing sequentially numbered pages. All entries will be made in waterproof ink, dated, and signed. No pages will be removed for any reason. Corrections will be made according to the procedures provided below.

The daily log is the responsibility of the field manager (or designee) and will include a complete summary of the day's activity at the site.

The following information will be included in the daily log:

- Name of person making entry (signature)
- Names of team members onsite
- Names of subcontractor personnel onsite
- Equipment used
- Levels of personnel protection
  - Level of protection originally used
  - Changes in protection, if required
  - Reasons for changes
- Documentation of samples collected, including
  - Sampling location, depth, and numbers
  - Sampling date and time and sampling personnel
  - Type of sample (grab or composite) and matrix
- Onsite measurement data
- Field observations and remarks
- Weather conditions and wind direction
- Unusual circumstances or difficulties
- Initials of person recording the information

### 4.3.3 Corrections to Documentation

**Logbook.** No pages will be removed for any reason. If corrections are necessary, they will be made by drawing a single line through the original entry. The correction will be initialed and dated. Corrected errors may require a footnote explaining the correction.

**Sampling Forms.** As previously stated, all sample identification tags, chain-of-custody records, and other forms must be written in waterproof ink. None of these documents will be destroyed or thrown away.

If an error is made on a document assigned to one individual, that individual may make a correction by crossing a line through the error and entering the corrected information. The corrected information will not be obliterated. Any subsequent error discovered on a document will be corrected by the person who made the entry. All corrections will be initialed and dated.

### 4.3.4 Photographs

Photographs will be taken to document each different construction activity and the equipment present at the site. Documentation of a photograph is crucial to its validity as a representation of an existing situation. The following information will be recorded in the logbook for each photograph:

- Date, time, and location the photograph was taken
- Photographer
- Description of photograph taken, including direction photographer is facing
- Sequential number of the photograph and the film roll number

## 4.4 Decontamination

### 4.4.1 Sampling Equipment

Sampling methods have been chosen to minimize decontamination requirements and the possibility of cross-contamination. Reusable (dedicated) sampling equipment is limited to the Van Veen grab sampler and Conductivity, Temperature and Depth (CTD) water column sampler.

The Van Veen grab sampler will be decontaminated by following these steps:

- Scrubbing with brushes in Alconox solution
- Two rinses with potable water
- Rinse in sea water

The CTD water column sampler will be decontaminated by rinsing in sea water between interval samples.

One rinsate blank will be collected for all analytes to document the effectiveness of decontamination efforts. Decontamination fluids generated during this project will be collected in 5-gallon drums. Furie will dispose of fluids on shore in an approved sewer system or discharged directly overboard. No water samples will be collected prior to discharge.

# TAB

## EMP Appendix B
## Quality Assurance Project Plan

# Quality Assurance Project Plan
## NPDES General Permit AKG-31-5022

2011 – 2016 EXPLORATION DRILLING PLAN

FURIE OPERATING ALASKA, LLC
KITCHEN LIGHTS UNIT

Kitchen Lights Unit #1
Kitchen Lights Unit #2
Kitchen Lights Unit #3
Kitchen Lights Unit #4
Kitchen Lights Unit #5

NORTH COOK INLET, ALASKA


Operator:

Furie Operating Alaska, LLC
1029 W. 3rd Avenue, Suite 500
Anchorage, AK 99501

**December 30, 2011**

# Table of Contents

# Glossary of Acronyms

| | |
|---|---|
| ASTM | American Society for Testing and Materials |
| Ba | barium |
| ºC | degrees Celsius |
| Cd | cadmium |
| CFR | *Code of Federal Regulations* |
| CM/SEC | centimeters/second |
| COC | chemical of concern |
| Cr | chromium |
| CTD | Conductivity, Temperature and Depth |
| Cu | copper |
| EPA | U.S. Environmental Protection Agency |
| °F | degrees Fahrenheit |
| $ft^2$ | square foot |
| GPS | global positioning satellite |
| Hg | mercury |
| KLI | Kinnetic Laboratories, Inc. |
| mg/kg | milligrams per kilogram |
| ML | milliliter |
| MS | matrix spike |
| MSD | matrix spike duplicate |
| NOI | Notice of Intent |
| NPDES | National Pollutant Discharge Elimination System |
| PAH | polynuclear aromatic hydrocarbon |
| Pb | lead |
| QA/QC | quality assurance/quality control |
| QAPP | quality assurance program plan |
| RPD | relative percent difference |
| SAP | Sampling and Analysis Plan |
| SW-846 | *EPA Publication SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* |
| TLC | teflon-lined screw |
| TLS | teflon-lined septa sonically bonded to screw |
| TSS | Total Survey Station |
| ug/kg | micrograms per kilogram |
| ug/L | micrograms per liter |
| USC | Unified Soil Classification system |
| USGS | U.S. Geological Survey |
| Zn | Zinc |

# Section 1: Objectives and Approach

This quality assurance project plan (QAPP) describes quality assurance procedures to be implemented for water column and benthic sediment sampling work to be carried out under the Furie Operating Alaska, LLC (Furie) environmental monitoring program.

This program is being implemented to meet monitoring requirements promulgated in the National Pollutant Discharge Elimination System (NPDES) *General Permit AKG-31-5000,* specifically, Section II, Part B, Subpart 5.d.v (*AKG-31-500.B.5.d.v*).

The objective of the QAPP is to present a system for planning, monitoring, assessing, and improving the quality of field and laboratory analytical data obtained during a site survey and sampling event. Quality assurance procedures may change based on site-specific instructions from the Furie and Beacon project managers. These are incorporated into and supersede procedures outlined in this QAPP only if they are more stringent or restrictive than what is required in this QAPP.

Quality control (QC) procedures routinely implemented in the field and the laboratory are discussed in the QAPP to show how data of known and accepted quality are produced for each site investigation. The QC procedures discussed in this QAPP support the field and analytical procedures described in site-specific sampling plans prepared by Furie.

The following topics are discussed in this QAPP:

- Personnel
- Data quality objectives
- Sampling procedures
- Chain-of-custody forms
- Laboratory analytical procedures
- Equipment maintenance and calibration
- Data reduction, validation, and reporting
- Quality control checks
- Precision, accuracy, and completeness assessment

## 1.1 Program Organization and Responsibilities

Key positions, personnel, and the associated responsibilities for project personnel are listed below.

- **Furie NPDES Program Manager—Bruce Webb**
  - Assigns resources to project tasks
  - Oversee specified scopes of work
  - Review project deliverables for quality before submittal to VDG
  - Monitor budgets and schedules for compliance with project objectives
  - Serve as points of contact with Furie staff
- **Furie Quality Assurance Contractor—Brian Webb, HSE Program Manager**

  **Beacon Occupational Health and Safety Services**
  - Oversees quality assurance (QA) program
  - Conducts field reviews and coordinates laboratory reviews

  - Provides ongoing review, monitoring, and evaluation of field and laboratory activities

- **Field Personnel—To be assigned under HSE Program Manager**

  - Assists in sampling activities
  - Makes field decisions
  - Provides progress reports and briefings to Furie project manager
  - Implements project health and safety plan

- **Senior Reviewers—Jacobs Engineering**

  - Helps plan general approach and interpret scope of work plan and reports
  - Provides senior technical review of all work plans and reports

- **Laboratory QA/QC Coordinator—SGS Laboratories**

  - Monitors implementation of laboratory QA program
  - Oversees implementation of QC procedures
  - Reviews laboratory reports before they are released to the Furie project and task managers

## 1.2 Quality Assurance Objectives

Quality assurance objectives are quantitative and qualitative goals that support specific agency regulatory action. The objectives summarized below are used to determine data acceptability, along with their data quality objectives.

- **Completeness** is defined as the total number of samples taken for which QC objectives are achieved, divided by the total number of samples analyzed, and multiplied by 100. Under perfect conditions, completeness would be 100 percent. The data quality objective for Furie projects for completeness is 80 percent.

- **Comparability** is a qualitative evaluation of how the data obtained for one set of samples can be compared to data obtained from another set, from another laboratory, or at another time. To achieve comparability, standard operating procedures and similar units of measure will be consistently used during sample collection, preservation, and analysis. Sampling and laboratory reports and procedures will be checked for conformity with these standard procedures and reporting formats. When non-standard procedures are used, data comparability will be addressed in the report of results. The data quality objective for Furie projects for comparability is based on qualitative evaluation.

- **Representativeness** is a measure of how closely the samples taken represent the site-wide population from which they were obtained. Representativeness is accomplished by (1) choosing the number of samples, sample location, and sampling procedures that will produce results showing as accurately and precisely as possible the matrix and site conditions being measured and (2) using documentation methods to assure that sampling protocols have been followed and that samples are properly identified to maintain their integrity.

  Samples are representative of site conditions when the selection of sampling locations is unbiased and standard field and analytical procedures are followed. When only source areas or other “hot spots” are sampled, the results are representative of the maximum concentration that may be at the site. Unusual field conditions or observations will be

documented in field notebooks specific to the project. This information will supplement the analytical data in evaluating analytical results to determine the significance of findings.

- **Accuracy** is a measure of the error between reported test results and the true sample concentration. Because true sample concentrations are not known, accuracy is usually inferred from recovery data, as determined by sample spiking. Accuracy is affected by the sample matrix and matrix interferences that may be present in the sample.
  For metals and conventional parameter analyses, the laboratory will analyze samples spiked with a known concentration of a reference standard to assess laboratory accuracy. For organic analyses, samples will be spiked with surrogate compounds, and selected samples will be spiked in duplicate with selected target compound list (TCL) compounds known as matrix spike/matrix spike duplicates (MS/MSDs). The data quality objective for accuracy is the laboratory QC limits.

- **Precision** is a measure of the variability of the data when more than one measurement is made on the same sample. Variability is commonly attributable to sampling activities and/or chemical analysis. For duplicate measurements, precision can be expressed as the relative percent difference (RPD). Analysis of field duplicate samples measures the precision of sampling procedures. Analysis of laboratory duplicate samples will serve to measure the precision of laboratory procedures. The frequency at which field duplicate samples will be collected is 5 to 10 percent. Field duplicate collection will be addressed in site-specific sampling plans. The data quality objectives for precision in Furie projects are laboratory QC limits and 100 percent RPD for soil and sediment samples and 50 percent RPD for water samples.

# Section 2: Sampling Procedures

## 2.1 Overview of Sampling Approach

Sampling procedures that affect data quality include the following:

- Method of sample collection
- Type and volume of sample containers
- Sample holding times and preservation
- Equipment decontamination procedures
- Sample documentation, transport, and storage

The following sampling approach will be followed to collect usable data.

- Background information, historical data, and site conditions will be collected and evaluated to prepare a site-specific sampling strategy.
- Field screening with instruments or by analytical methods will be accomplished to determine where samples will be collected plan actions to protect health and safety.

Samples will be collected with pre-cleaned tools, in accordance with standard practices described in Section 2.8. All sediment and water samples will collected and preserved in appropriate sample containers as described in the project-specific sampling and analysis plan (SAP).

## 2.2 Documenting Sampling Procedures

Field logbooks will be used to document the collection of samples and site data. Deviations from standard sampling procedures will be approved by Furie and documented in the field logbook. Standardized sampling forms will be used to record field measurements, sampling details, chain of custody, sample labels, and monitoring well evaluation details. Data recorded in the field logbook will include the following.

- Fieldwork documentation.
- Field instrumentation readings.
- Photograph references.
- Sample tag and label numbers.
- Field descriptions, equipment used, personnel present, and field activities accomplished to reconstruct field operations.
- Meeting information.
- Important times and dates of telephone conversations, correspondence, or deliverables.

Field calculations and equipment calibration records will also be recorded in field logbooks. The calculation methods and the format for recording the calculations will meet the applicable procedures for that instrument.

## 2.3 Pre-Sampling Activities

### 2.3.1 Collecting Site Background Information

Before fieldwork begins, the following information may be collected, where possible, depending on the specific project:

- Information on tides and currents
- Information on historical operations and practices, previous site investigation reports, and similar items
- History of discharges and available data from previous on-rig monitoring sampling at the site
- Types and classification of benthic sediments
- Chemical and physical data on drilling fluids and muds
- Location of proposed random samples
- Depth to groundwater seafloor
- Leasehold line locations

### 2.3.2 Determining Current Direction

Before sediment samples are collected, information on current direction and speed must be determined to help insure systematic sediment sampling occurs in areas most likely to be impacted by discharges of drilling fluids and muds. This will be done by:

- Documenting current direction and speed by using an electromagnetic (or similar) current meter
- Tidal fluctuations by shipboard fathometer

Results will be recorded in the field logbook.

## 2.4 Field Screening

### 2.4.1 Field Screening Devices

#### Hydrocarbons

For hydrocarbons, the following field screening instruments may be used:

- X-ray fluorescence (XRF)
- Photoionization detector (PID) or flame ionization detector (FID)
- Portable infrared spectroscopy instrument (IR)
- Immunoassay field kits (such as the EnSYS PETRO R/SC Test Kit)
- Alkylation field chemistry kits (such as the Hanby Field Test Kit)

PIDs and FIDs can measure groups of volatile organic vapors in soil (using a headspace technique) or in air. These instruments should be used in conjunction with other screening methods to guide sampling activities. Whichever field screening instrument is used, its accuracy will be verified by using appropriate standards that match the use intended for the data. Immunoassay field kits may be used to support information collected using soil gas

screening methods. While olfactory or visual methods can also be used to field screen, field screening techniques mentioned in this QAPP refer only to mechanical methods.

### Water Column Field Screening

For water quality field screening, the following instrumentation will be attached to a rosette:

- Temperature probe
- Salinity probe
- Turbidity probe

## 2.5 Determining Laboratory Sample Locations

The numbers of laboratory samples collected during a survey are outlined in the attached Environmental Monitoring Plan (EMP) and Sampling and Analysis Plan (SAP). Sample locations will depend on current direction and will generally be collected at slack tide.

Sampling locations will be mapped and referenced based on surface location of the sampling vessel, based on global positioning satellite (GPS) imagery and coordinates.

## 2.6 Collecting Hydrographic Water Samples

Water column screening sampling surveys will be carried out by vessel and usually at the same time as geohazard surveys required by the Alaska Oil and Gas Conservation Commission (AOGCC).

Hydrographic studies will focus on water column temperature, salinity and turbidity by a Conductivity, Temperature and Depth (CTD) sampler. The CTD and turbidity sensors are attached to a cage-like apparatus called a rosette (right). The rosette is heavy so that it will sink to the seafloor if required, while protecting the instruments if the rosette bangs against rocks and/or drags along the bottom.

During each monitoring/sampling event, water column sampling by CTD will be done at three locations:

- Incoming tidal current direct
- Outgoing tidal current direction
- Cross current.

At each location, sampling will be done at three intervals:

- 1 meter below the surface
- Halfway to the seafloor
- About 2 meters above the seafloor.

## 2.7 Collecting Sediment Samples

Benthic sediment samples will be collected at slack tide, by either a single or double Van Veen grab sampler. The jaws of the grab are set open like a trap, and when the grab sampler hits bottom, the trap snaps shut, capturing the sediment sample.

Systematic sampling will occur at three 100-meter stations downcurrent of the discharge point. As current direction is tidal in upper Cook Inlet, this means three samples will be collected along the outgoing current direction at slack tide, and another three samples will be collected along the incoming current direction at the next slack tide. Random grid sampling also will occur at two locations during baseline (pre-drilling) sampling.

Sediments will be logged by using the Unified Soil Classification System and outlined in *American Society for Testing and Materials (ASTM) D2400.*

The following procedures will be used to collect soil samples for submittal to an offsite laboratory:

- Sediment will be obtained from fresh sample grabs. Immediately before collection, at least 2 inches of material will be removed from the bucket
- The grab sample will be composited before filling the sample containers, and then submitted for offsite geochemical analysis.
- Unless disposable equipment is used to collect the soil sample, the sampling equipment will be decontaminated in between each sample collection (Section 4.8).

To minimize collection errors, the following steps will be taken:

- All samples will be collected using disposable or clean tools that have been decontaminated as outlined in Section 4.8.
- Disposable gloves will be worn and changed between sample collections.
- Sample containers will be filled and covered quickly.
- Soil samples will be placed in containers in the order of volatilization sensitivity.
- Containers will be quickly and adequately sealed. The rims will be cleaned before lids are tightened.
- Sample containers will be labeled as outlined in Section 4.9.2. Clear, wide tape will be placed over the sample label to secure the label to the sample jar.
- Individual soil sample containers will be placed in re-closable plastic bags in case of bottle breakage during transit. Samples will immediately be preserved according to procedures in Section 4.9. Samples will be shipped on ice to the laboratory.
- A chain-of-custody form will be completed listing time, date, sample matrix and identification (ID) number, analysis requested, and sampler's signature. A custody seal will be placed over each sample jar when possible and over the sample cooler at a minimum.

# Section 3: Decontamination Procedures

The objectives of decontamination are to prevent the following.

- Introduction of contamination into samples from sampling equipment or from other samples.
- Contamination from leaving the sampling site by way of sampling equipment, personnel, or construction materials.
- Exposure of field personnel to contaminated materials.

The CTD sampler used for water column sampling will not require decontamination. Therefore, this section discusses general procedures to be followed during sediment sampling to meet the above objectives.

## 3.1 Soaps and Detergents

Alconox or Liquinox will be used as the “detergent” for cleaning all equipment and materials. Use of other products must be approved by the project manager.

## 3.2 Personnel

Personnel decontamination procedures depend on the level of protection specified for a given activity. The Furie Health and Safety Plan will identify the appropriate level of protection for each type of fieldwork.

## 3.3 Sampling Equipment

This section describes the procedures to be used to decontaminate sampling equipment before the equipment is taken to the project area and between uses.

Sampling equipment includes, but is not limited to, the following:

- Van Veen grab samplers
- CTD Samplers
- Coring devices
- Stainless steel knives, spatulas, and mixing bowls
- Stainless steel scoops, spoons, and trowels
- Hand cores and augers
- Sample thieves
- Bailers

Based on field conditions, Furie also opt to use the following:

- Coring devices
- Stainless steel knives, spatulas, and mixing bowls
- Stainless steel scoops, spoons, and trowels
- Hand cores and augers
- Sample thieves
- Bailers

Equipment used to collect samples for chemical analyses will be cleaned before field use and between each sample collection according to the following steps:

- Detergent (Alconox or Liquinox) and tap water wash
- Tap water rinse
- Seawater rinse enroute to seafloor for next sample

Equipment that does not become visibly contaminated during drilling may be exempted from cleaning at the discretion of the field team leader.

# Section 4: Sample Containers, Preservation, and Holding Conditions

Sample container, preservation, and holding time requirements are summarized in the program SAP (also attached). Holding time starts at the time of sample collection in the field.

All samples will be stored on ice. Water samples for dissolved metals analysis will be submitted to the laboratory for immediate filtration and preservation. The samples will be preserved by acidifying with nitric acid. Samples for other analytes will be preserved in the field as required by the standard methods.

## 4.1 Sample Containers

Most sample containers will be glass jars with Teflon lids. Sample jars of the proper type of material, size, and type of lid are listed in each project-specific SAP, as are the preservation methods and maximum holding times for each analyte of interest.

Before they are sent to the site, all sample containers will be inspected for undamaged lids and tight seals. Jars will be placed into secured containers to prevent damage or tampering in transit to the site. Containers and lids will be re-inspected at the job site; containers that have lost lids or have been damaged will not be used.

### 4.1.1 Sample Labels

Sample labels must be completed properly to prevent misidentification of samples. Labels will be marked with indelible ink pens and firmly affixed to the sample containers. The spaces on the label are self explanatory, but the following sections should be noted.

- Place of Collection—Enter the well or station number. Enter sampling depth where appropriate.
- Field Information—Indicate the type of analysis, such as VOA, and sample preservative.
- Collector's Sample Number—Enter the sample number which includes the site identifier, the sample description, the sample number, and if appropriate, the upper depth of the sampling interval.

Clear, wide tape will be placed over the sample label to prevent loss of the label and to prevent smudging of the sample identification. The sample identification number should also be written with indelible ink on the cap of the sample bottle in case the sample label is lost or destroyed.

Each sample collected for analysis will be assigned a unique sample tracking number.

## 4.2 Holding Times

Sample handling, transport, and analysis will be arranged so that the recommended maximum holding times established by U.S. Environmental Protection Agency (EPA) and other laboratories are not exceeded.

# Section 5: Sample Custody

Requirements in this section apply all samples collected for Furie projects and are not limited to those samples collected to verify that a site meets cleanup guidelines.

## 5.1 Field Logbook

All information pertinent to field activities must be entered in a bound book with consecutively numbered pages. Entries in the logbook must include, if applicable, the following:

- Date and time of entry
- Name and address of field contact (federal, state, or local representatives)
- Responsible party and the site address
- Type of process producing the material
- Type of media sampled (drinking water, wastewater, sediment, etc.)
- Description of sample
- Material components and concentration
- Number and size of samples taken
- Description of sampling location
- Date and time of sample collection
- Sample identification number(s) and collector's name
- References such as maps or photographs of the sampling site
- Field observations
- Any field measurements made, such as pH, total organic vapors, or explosiveness

## 5.2 Photographs

Photographs can be the most accurate demonstration of the field worker's observation. A photograph must be documented if it is to be valid representation of an existing situation. For each photograph taken, the following will be recorded:

- Date and time
- General direction faced and description of the subject
- Location on site
- Sequential number of the photograph and roll number

## 5.3 Chain-of-Custody Procedures

Written procedures must be followed whenever samples are collected, transferred, stored, analyzed, or tested. A sample is considered to be in someone's "custody" if

- It is in one's actual possession, or
- It is in one's view while being in one's physical possession, or
- It is in one's physical possession and then secured so that no one can tamper with it, or
- It is kept in a secured area, restricted to authorized and accountable personnel only.

During sample collection and shipment, specific procedures will be followed to maintain proper chain-of-custody and accurate field inventory sheets, logbooks, and other supporting documentation.

## 5.4 Sample Collection, Handling, and Identification

The number of persons involved in collecting and handling samples will be minimized. Field records will be completed at the time the sample is collected and will be signed or initialed, including the date and time, by the sample collector(s). Field records should contain the following information:

- Unique sampling or log number
- Date and time
- Source of sample (including name, location, sample type)
- Preservative used
- Analysis required
- Name of collector(s)
- Pertinent field data (pH, dissolved oxygen, chlorine residual)

The sample container should then be placed in a transportation case, along with the chain-of-custody record form, pertinent field records, and analysis request forms as needed. The transportation case should be sealed or locked.

## 5.5 Transfer of Custody and Shipment

When transferring the samples, the transferee must sign and record the date and time in the chain-of-custody record. Custody transfers in the field should be documented and account for each sample, although samples may be transferred as a group. Every person who takes custody must fill in the appropriate section of the chain-of-custody record.

All packages sent to the laboratory should be accompanied by the chain-of-custody record and other pertinent forms. A copy of these forms should be retained by the originating person. Mailed packages can be registered with return receipt requested. For packages sent by common carrier, receipts should be retained as part of the permanent chain-of-custody documentation. Samples to be shipped must be packed so as not to break, and the package should be sealed or locked. The preferred procedure includes use of a custody seal wrapped across filament tape that is wrapped around the package at least twice.

# Section 6: Analytical Procedures

## 6.1 Field Screening Procedures

If used, field screening analyses with PIDs and FIDs will follow the procedures outlined in Section 2.4. Other field screening methods, such as that for soil gas, will be presented in site-specific work plans.

## 6.2 Analytical Laboratory

Only results from laboratories meeting the following criteria will be accepted by Furie for use in reports prepared under provisions of this QAPP:

- Laboratories that have required federal and state permits and/or accreditation
- Laboratories approved by Furie

While laboratories are expected to assure satisfactory levels of quality control within the laboratory, Furie verifies that analytical testing meets the objectives of this QAPP. The laboratory will be selected based on its ability to meet these objectives. Furie will review laboratory results and performance for compliance with the objectives. Furie will report any deviation by the laboratory from the laboratory methods and procedures required by this QAPP, or, if known, any other deviation from standard laboratory procedures.

## 6.3 Calibration and Maintenance of Equipment

The following procedures will be used to calibrate and maintain field instruments.

- At a minimum, operation, maintenance, and calibration will be performed in accordance with the instrument manufacturer's specifications.
- All standards used to calibrate field instruments will meet the minimum requirements for source and purity recommended in the equipment's operation manual.
- Acceptance criteria for calibration will be set depending on the potential contaminant and will be within the limits set in the operations manual.
- The dates, times, and results of all calibrations will be recorded in the field logbook.

## 6.4 Data Reduction, Validation and Reporting

Data reduction will be performed by the laboratory, except for QC information on blind field blanks and duplicates. Data validation is the systematic process of comparing QC data to acceptance criteria. Laboratory data reports will be attached to all reports that are issued for Furie projects.

### 6.4.1 Responsibility for Laboratory Data Reduction and Validation

While the laboratory reduces, validates, and reports on data they process, Furie performs and additional QC check. Therefore, Furie will

- Select laboratories based on their demonstrated ability to properly reduce, validate, and report data.
- Review all laboratory results and performance to see that the objectives are met.

### 6.4.2 Data Reduction

Most data reduction occurs in the laboratory, using procedures outlined in the accepted laboratory's QA/QC procedures. Following the initial data reduction process, Furie will summarize the data on spreadsheets developed specifically for data presentation.

### 6.4.3 Data Validation

Furie will validate field and laboratory data before it is used in a report. Data validation will be documented in the report and will be used to evaluate sample results. Validation efforts will not involve a review of raw data unless specifically requested by EPA.

**Validation of Field Reports**
The Beacon QA officer may examine some information collected through the field documentation process (Section 4.2). This information will be checked for the following:

- Completeness
- Accuracy (transcription errors, internal consistency)
- Unexpected results, with accompanying possible explanations
- Adherence to sampling procedures as outlined in Section 4
- Comparison of field instrument results with laboratory results

Field audits will be performed on a percentage of projects, depending on project size and complexity.

**Validation of Laboratory Data**
There are three levels of data validation:

1. The sample analyst will document and evaluate the analytical results using the laboratory's QA/QC procedures.
2. The supervisor or QA coordinator of the laboratory will examine the sample results and any attached documentation or explanations of the sample analyst.
3. Furie personnel who have the professional education, experience and training necessary to meet a project's technical and regulatory requirements will conduct a final review. This level of validation will be performed on a site-specific basis.

## 6.5 Data Reporting

### 6.5.1 Information to be Included in Reports

Project reports requiring this QAPP will include the following.

- Laboratory reports for all samples (including field QC samples).

- An interpretation of data and sampling results.
- A case narrative for the project.
- A separate section or attachment discussing any deviation from the procedures outlined in this QAPP, and any relevant information compiled from field records or other information. This includes, but is not limited to, deviations from this QAPP for any sampling or analytical methods and procedures, whether used by Furie or by the laboratory.

### 6.5.2 Data Deliverables for Samples

For each project conducted under the provisions of this QAPP, the laboratory will provide a report with the following information:

- Laboratory name, address, telephone number, and fax number (if available)
- Report date
- Type of analysis (gasoline, diesel, etc.) and Analytical and extraction method used
- Type of matrix
- Field sample number and Laboratory sample number
- Laboratory file identification number
- Date sampled, received and extracted
- Date analyzed
- Site or project name
- Concentrations of analyte
- Definitions of any characters used to qualify data
- Analyst's name, signature, or initials, and date signed
- Dilution factor
- Narrative summary report for each set of samples

Raw data will be maintained by the laboratory and provided to EPA on request.

# Section 7: Quality Control Checks

## 7.1 Field Quality Control Samples

Field QC samples include the following.

- **Trip blank,** which is a sample of analyte-free media taken from the laboratory to the sampling site along with each batch of sampling containers and returned to the laboratory with the samples. A trip blank will be used to document contamination attributable to contaminated sampling containers or airborne contaminants. This type of blank will be used only when trace volatile organic compounds are being investigated.

  Where a trip blank is required, at least one trip blank will accompany each set of containers in the field. One trip blank will accompany each shipment of samples to the laboratory.

- **Field duplicates,** for sediment samples. Field duplicates for sediment samples are collected and then split in the field. Field duplicates for water are samples collected from the same bailer contents. Both types are two separate samples taken from the same source, stored in separate containers, and analyzed independently. Field duplicates are useful in documenting the precision (variability) of the sampling process.

  At least 1 field duplicate per 10 field samples will be collected for each matrix sampled. All field duplicates will be blind samples, given unique sample numbers just like any other field sample. Their collection will be adequately documented. The results from field duplicate samples will be used to evaluate precision in field sampling. The formula in Section 10 will be used to calculate precision.

## 7.2 Laboratory Quality Control Samples

Furie will verify that laboratories used for Furie projects have approved QA plans on file with the ADEC. Laboratory QC tests will include the following.

- **Surrogates.** A surrogate will be added to every sample analyzed for organics, including quality control samples, before sample analysis.

- **Matrix spike and matrix spike duplicate samples.** Matrix spike/matrix spike duplicate (MS/MSD) samples will be analyzed with each set of 20 samples. MS/MSD samples will provide the percent recovery and relative percent difference to document the precision and accuracy of the analytical results. In analyte MS/MSD analysis, predetermined quantities of target analyte stock solutions are added to a sample matrix before sample extraction/digestion and analysis. Samples are split into duplicates, spiked, and analyzed. These data are used to evaluate analytical precision from the calculation of RPD and accuracy from recoveries.

- **Reagent blank.** Each sample batch will be analyzed with a reagent blank and calibration check sample. The reagent blank will be carried through the entire analytical procedure. It is used to evaluate possible contamination of sample preparation and analytical equipment by target analytes.

# Section 8: Data Quality Indicators

The procedures and calculations presented here are used to help determine if the results of sampling and analysis have met the QAPP data quality objectives. Reporting of data quality indicators will be in accordance with Section 8 and will be reported by Furie. Calculation of data quality indicators will be according to the following:

- Furie will calculate field sampling precision using field duplicate sample results and the formula for precision in Section 8 below, and the completeness of the data set from the formula also in Section 8.
- The laboratory will calculate or assess all items in Section 7.

## 8.1 Field Sampling Precision and Accuracy

### 8.1.1 Field Sampling Precision

Precision is a measure of the variability in the data set attributable to sampling or analytical precision. For purposes of this plan, precision is indicated by the relative percent difference (RPD) in concentrations between duplicate samples, and will be calculated using the following formula:

$$RPD = \frac{X_1 - X_2}{\overline{X}} \times 100$$

Where: $X_1$ = concentration in the first sample of the pair
$X_2$ = concentration in the second sample of the pair
$\overline{X}$ = the mean concentration of the two samples.

### 8.1.2 Accuracy

Accuracy is a measure of the closeness of an individual measurement or an average of a number of measurements to the true value. This measure will be based on surrogate and/or spike recovery and the impact of matrix interference will be considered. For purposes of this QAPP, accuracy is indicated by matrix spiked samples and will be calculated using this formula:

$$Percent\ recovery = \frac{X - X_0}{X_s} \times 100$$

Where: $X$ = reported concentration in the spiked sample
$X_0$ = concentration target analyte before spiking
$X_S$ = known concentration added to the sample.

## 8.2 Completeness

Completeness is a measure of the amount of valid data obtained compared to the amount expected. For purposes of this QAPP, completeness is calculated as a percentage of the amount of usable samples divided by the total number of samples and will be calculated using the following formula:

*Percent Completeness = (V / N) x 100*

Where:

V = number of valid samples, as determined by above calculations and by procedures outlined in Section 8.3.3 (Determining the Validity of Samples)

N = total number of samples.

# TAB

## Attachment 4

## BEST MANAGEMENT PRACTICES PLAN

# Best Management Practices Plan
## NPDES General Permit AKG-31-5022

2011 – 2016 EXPLORATION DRILLING PLAN

FURIE OPERATING ALASKA, LLC
KITCHEN LIGHTS UNIT

Kitchen Lights Unit #1
Kitchen Lights Unit #2
Kitchen Lights Unit #3
Kitchen Lights Unit #4
Kitchen Lights Unit #5

NORTH COOK INLET, ALASKA


Operator:

Furie Operating Alaska, LLC
1029 W. 3rd Avenue, Suite 500
Anchorage, AK 99501

**December 30, 2011**

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**LIST OF TABLES**

# Glossary of Acronyms

| | |
|---|---|
| *AKG-31-5000* | NPDES General Permit AKG-31-5000 |
| ADEC | Alaska Department of Environmental Conservation |
| AOGCC | Alaska Oil and Gas Conservation Commission |
| Beacon | Beacon Occupational Health and Safety Services |
| BMP | Best Management Practices |
| BCP | Blowout Contingency Plan |
| bbls | barrels |
| CFR | Code of Federal Regulations |
| EPA | U.S. Environmental Protection Agency |
| Furie | Furie Operating Alaska, LLC |
| MSDA | Material Safety Data Sheets |
| NADF | Non-aqueous drilling fluids |
| NOI | Notice of Intent |
| NPDES | National Pollutant Discharge Elimination System |
| ODPCP | Oil Discharge Prevention and Contingency Plan |
| PM | Preventive maintenance |
| USGS | U.S. Geological Survey |

## Review Certification Requirements

### Review by Facility Engineering Staff and Facility Managers *[(AKG-31-5000(IV)(D)(2)(a)]*

Based on my signature below and to the best of my knowledge, I certify the following.

- This document and all attachments were reviewed by facility engineering staff and the facility managers.
- The BMP Plan fulfills the requirements set forth in NPDES General Permit AKG-31-5000.

Signature: B D. Webb Date: 12/30/2011

Printed Name: Bruce D. Webb Title: VP Governmental and Regulatory Affairs

Furie Operating Alaska, LLC

### Review by Facility BMP Plan Committee *[(AKG-31-5000(IV)(D)(2)(b) and (c)]*

Based my signature below and to the best of my knowledge, I certify that this document and all attachments were reviewed by Furie's BMP Committee, and that the plan fulfills the requirements set forth in *NPDES General Permit AKG-31-5000*.

**Endorsed by:**

Signature: B L Webb Date: 30 Dec 11

Printed Name: Brian L. Webb Title: Furie HSE Program Manager

Beacon Occupational Health and Safety

# BMP Plan Documentation, Modification and Modification for Ineffectiveness

## Documentation *[(AKG-31-5000(IV)(E)]*

Furie will maintain a copy of the BMP Plan on the Spartan 151 jackup drill rig (mobile facility) and will make the plan available to U.S. Environmental Protection Agency (EPA) and Alaska Department of Environmental Conservation (ADEC) upon request. Another copy will be maintained in the Furie/Beacon Health, Safety and Environmental (HSE) ProgramManager's office in Anchorage, Alaska.

## BMP Plan Modification *[(AKG-31-5000(IV)(F)]*

Furie will amend the BMP Plan whenever there is a change in the facility (i.e. change in drill rigs) or in the operation of the facility that materially increases the generation of pollutants or their release or potential release to the receiving waters.

Furie also will amend the plan, as appropriate, when facility operations covered by the BMP Plan change. Any such changes to the BMP Plan shall be consistent with the objectives and specific requirement listed in Section 1 of the plan. All changes in the BMP Plan will be reviewed by the exploration facility engineering staff and managers.

In addition, Furie will submit a certification signed in accordance with *EPA Guidelines, Report Number 832/R-92/006*, to the EPA Director that the corrected changes have been made.

## Modification for Ineffectiveness *[(AKG-31-5000(IV)(G)]*

At any time, if the BMP Plan proves to be ineffective in achieving the general objective of preventing and minimizing the generation of pollutants and their release and potential release to the receiving waters and/or the specific requirements above, the BMP Plan will be subject to modification to incorporate revised BMP requirements.

# Section 1: Introduction

Furie Operating Alaska, LLC (Furie) is providing a Notice of Intent (NOI) for coverage under *National Pollutant Discharge Elimination System (NPDES) General Permit AKG-31-5000* (*AKG-31-5000)* for oil and gas exploration drilling in state of Alaska coastal waters of the upper Cook Inlet. The purpose of the permit application will be to allow Furie authorized discharges during drilling activities in coastal waters, starting May 2011.

Drilling will be conducted by Spartan 151 jackup drill rig (Baker Marine Class 150 HC or smaller class) during ice-free months. Furie's initial plans for drilling activities in coastal waters include a five-year, five well exploration program. Depending on results, additional wells may be drilled (See Section 1.1).

*AKG-31-5000* allows for discharges from new oil and gas extraction facilities engaged in exploration activities under the Offshore and Coastal Subcategories of the Oil and Gas Extraction Point Source Category found in Chapter 40, *Part 435, Subparts A and D* of the Code of Federal Regulations *[40 CFR 435 (A) and (D)].*

## 1.1 BMP Plan Requirements, Design and Objectives

*AKG-31-5000* requires new exploratory facilities to submit a best management practices (BMP) plan to EPA for review with, or prior to, submission of a NOI.

This BMP Plan and related program has been designed to prevent or minimize the generation and the potential release of pollutants from the facility to the waters of the United States through normal operations and ancillary activities.

BMP Plan objectives include the following.

- Minimizing the number and quantity of pollutants and the toxicity of effluent generated, discharged or potentially discharged to the extent feasible by managing each waste stream in the most appropriate manner.
- Examining Furie drilling operations to minimize the opportunities (and potential) for causing a release into Cook Inlet due to equipment failure, improper operation, and natural phenomena such as rain or snowfall.

The plan has been prepared and formatted to meet requirements of *AKG-31-5000*, Part IV, Section D *[AKG-31-5000(VI)(D)].*

Furie provides this BMP Plan to the EPA in support of its NOI to use NPDES General Permit *AKG-31-5000*, pursuant to *40 CFR Part 435, Subparts A and D*, and as outlined and prescribed by *AKG-31-5000* (AKG-31-5022).

## 1.2 Contact and Summary Discharge Information (for Mobile Facility)

*Furie may opt to drill more than five exploration wells; therefore, Furie is requesting continued permit coverage as a mobile facility, operating in the upper Cook Inlet area*.

Additional information on the Spartan 151, facility contacts, and the latitude and longitude of the initial exploration well (plus the following four exploration wells) is presented in the Notice of Intent Information Sheet and Attachment 1 Exploration Plan.

Furie will notify EPA, in writing, 7 days prior to moving the Spartan 151 and will provide latitude and longitude of the next exploration well location.

## 1.3 Plan Organization

The BMP Plan is organized by components and phases as discussed in the *Guidance Manual for Developing Best Management Practices (BMPs)* (USEPA, 1993) into the following sections.

- **Section 1: Introduction**
- **Section 2: BMP Plan Planning Phase**
- **Section 3: BMP Plan Development Phase**
- **Section 4: BMP Evaluation and Re-evaluation Phase**

As noted earlier, this plan is subject to modification as the program proceeds, with revisions subject to EPA approval.

# Section 2: BMP Plan Planning Phase

The planning phase focuses on demonstrating Furie and Spartan 151 management support for the BMP Plan, and identifying and evaluating areas/activities/operations carried out on the Spartan 151 that will be addressed by BMPs. This was achieved by (1) forming a BMP committee for the Spartan 151 drilling operations in Cook Inlet, (2) developing a BMP policy statement, and (3) performing a release identification and evaluation

## 2.1 BMP Committee

Furie committee members and specific responsibilities for the North Cook Inlet drilling program are listed and described Table 1.

**Table 1: Best Management Practices Committee**

| Name/Company | Position | Responsibilities |
|---|---|---|
| Bruce Webb, Furie<br><br>Brian Webb, Beacon | Lead Committee Chairperson<br><br>HSE Manager | Represent Furie management in implementing BMPs.<br>Conduct meetings and aid in decision-making process.<br>Assign tasks to appropriate personnel.<br>Communicate BMPs to Spartan 151 personnel.<br>Provide expertise on compliance issues. |
| To be determined Spartan Offshore | Spartan 151 Rig/Barge Engineer | Provide expertise and full understanding of fluids movement throughout the Spartan 151 |
| To be determined/ Cook Inlet Drilling | Offshore Installation Manager (OIM) | Provide expertise on drilling operations. |

General BMP Committee Activities and Responsibilities include the following.

- Develop the scope of the BMP Plan
- Make recommendations in support of the BMP Policy Statement (Subsection 2.2)
- Review existing spill control plans and drill fluid plans to evaluate existing BMPs
- Conduct assessments to prioritize substances, discharges and areas of concern (Subsection 2.3)
- Select appropriate BMPs (Section 3)
- Establish and then implement procedures for recordkeeping and reporting (Section 3)
- Evaluate the effectiveness of the BMP Plan in preventing/mitigating releases (Section 4)
- Periodically review the BMP Plan to evaluate the need to update and/or modify the BMP Plan

## 2.2 BMP Policy Statement

*Drilling operations and support operations will endeavor to minimize waste fluids and muds as much as possible prior to permitted discharge offshore or treated/disposal onshore. This will be done by implementing source reduction, recycling/reusing, and by practicing good housekeeping measures with inspections measures whenever possible...*

## 2.3 BMP Release Identification and Evaluation

Release identification involves the systematic cataloging of drilling operations and support activities, and assessing these potential releases to determine the impact to human health and the environment. This process resulted in the evaluation of both discharges allowed under *AKG-31-5000* and potential discharges not allowed under *AKG-31-5000*.

### 2.3.1 Identified Discharges Allowed Under *AKG-31-5000*

There are 19 discharges, or outfalls, allowed under the *AKG-31-5000 general permit.* Those that apply to the Spartan 151 are listed below in Table 2. Several streams will be typically disposed in an onshore Class II injection well operated by Furie. However, should disposal well failure occur, these streams shall be discharged overboard in compliance with the permitted terms and conditions.

**Table 2: Identified Discharges (Outfalls) Allowed Under *AKG-31-5000* Applicable to Exploration Facility**

| Discharge No. | Outfall Type |
|---|---|
| **Outfall Types PER Proposes to Typically Discharge** | |
| 001 | Drilling Mud and Cuttings |
| 002 | Deck Drainage |
| 003 | Sanitary Waste |
| 004 | Domestic Waste |
| 005 | Desalination Unit Waste |
| 007 | Boiler Blowdown |
| 009 | Non-Contact Cooling Water |
| 010 | Uncontaminated Ballast Water |
| 011 | Bilge Water |
| 012 | Excess Cement Slurry |
| 013 | Mud, Cuttings, Cement at the Seafloor |
| | |
| **Outfall Types PER Proposes to Occasionally Discharge** | |
| 006 | Blowout Preventer Fluid (emergency only) |
| 008 | Fire Control System Test Water (during tests and/or emergency only) |
| 019 | (Drill Stem) Test Fluids |

With the exception of Discharge 007 (blowout preventer fluid), general BMPs and discharge-specific BMPs have been developed for applicable outfalls, and are presented in Section 3.

General and specific BMPs for Blowout Preventer Fluid are presented in detail in the Furie Blowout Contingency Plan (BCP), Oil Discharge Prevention and Contingency Plan (ODPCP) and Alaska Oil and Gas Conservation Commission (AOGCC) permit to drill.

Additionally, based on Furie's Exploration Plan (Attachment 1), several discharge fluids allowed under *AKG-31-5000* are currently not a part of the exploration program, but are listed for future coverage. These include waterflooding (014), produced water and produced sand (015), completion fluids (016), completion fluids and well treatment fluids (018). Therefore, they are not addressed in this BMP.

### 2.3.2 Other Potential Identified Discharges or Releases

Table 3 lists other applicable potential discharges from drilling operations and support activities.

**Table 3: Other Potential Discharges (not allowed under *AKG-31-5000*)**

| Potential Discharge/Released | Notes |
|---|---|
| Cuttings in Hydrocarbon-bearing Zones | General BMPs and waste-specific BMPs developed and presented in Section 3. |
| Non-aqueous drill fluids | General BMPs and waste-specific BMPs developed and presented in Section 3. |
| Used Petroleum Oil and Lubricants (POLs) | General and waste-specific BMPs not presented in Section 3. These are in PER's Oil Discharge Prevention and Contingency Plan (ODPCP). |
| Trash & Debris .During Exploration | General BMPs and waste-specific BMPs developed and presented in Section 3. |
| Crude Oil from Blowout | General and waste-specific BMPs not presented in Section 3. These are in the Oil Discharge Prevention and Contingency Plan (ODPCP). |
| Diesel Fuel from a Tank Rupture | General and waste-specific BMPs not presented in Section 3. These are in ODPCP. |
| Diesel Fuel from a Transfer Failure | General and waste-specific BMPs not presented in Section 3. These are ODPCP. |

# Section 3: BMP Plan Development Phase

Based on wastes targeted for BMPs, the Furie committee has selected the most appropriate BMPS that are most effective in reducing, controlling or eliminating waste discharges and releases. For this BMP plan, these include general BMPs and facility -specific BMPs.

## 3.1 General BMPs

General BMPs for this exploration program consist of the following six components.

| | | | |
|---|---|---|---|
| 1 | Good housekeeping | 4 | Security |
| 2 | Preventive Maintenance | 5 | Employee Training |
| 3 | Inspections | 6 | Recordkeeping and Reporting |

Each component is described below.

### 3.1.1 Good Housekeeping

Good housekeeping is a program by which the Spartan 151 is kept in a clean and orderly fashion to help avoid releases and/or cross contamination of waste types.

Good housekeeping on the Spartan 151 in support of this BMP Plan will include orderly storage of bags (dry material) and drums (fluids); prompt cleanup of liquids to avoid runoff reaching receiving; and expeditious sweeping, vacuuming, or other cleanup of dry materials to prevent them reaching receiving waters via stormwater runoff.

These will be achieved by completing the following steps.

- Designating and labeling appropriate storage areas for every material and every piece of equipment.
- Emphasizing and establishing procedures requiring that materials and equipment be placed in or returned to their designated areas.
- Establishing a schedule to check areas to detect release (i.e. inspection) and ensure that releases are mitigated.

General housekeeping for drilling and drilling support activities on the Spartan 151 also will include the following

- Insuring all products stored outside are protected from Cook Inlet weather.
- Not storing partial units (open sacks or drums) outside.
- Using complete unit amounts of products (sacks, drums, cans), as much as possible in order to minimize inventory of partial units.
- Insuring all hoses are properly secured when transferring fluids and/or cuttings from the rig to tanks.

### 3.1.2 Preventive Maintenance

Preventive maintenance (PM) focuses on preventing releases or cross contamination caused by equipment problems. The Spartan 151 has an existing PM program that periodically inspects, maintains and tests equipment and systems to uncover conditions which could cause breakdowns or failures. As part of the BMP Plan, preventive maintenance also will focus on controlling discharges and preventing releases by focusing on the areas and wastes to be of most concern.

Therefore, Furie will review the Spartan 151 program to evaluate if it, at a minimum, includes the following activities.

- Identifying and cataloging equipment, systems and structures to which the PM program should apply, specifically with respect to source reduction and controlling discharges to prevent releases.
- Determining and performing appropriate PM activities and maintenance schedules.
- Organizing and maintaining complete PM records.

### 3.1.3 Inspections

Regularly scheduled inspections will be used as oversight mechanisms to help ensure selected BMPs are being implemented. Testing and inspection of the pollution prevention equipment and systems on the Spartan 151 will be conducted on a scheduled basis as determined by the conditions and circumstances that exist, or as required by other regulations. To meet this requirement, three types of schedules will be followed: daily, monthly, and annually. The BMP committee chairperson will develop the scope of each inspection, assign personnel to conduct each inspection, develop an inspection schedule, provide forms to report inspection results, and determine remedial actions to be taken as result of inspection findings.

Inspections will be in accordance with written procedures developed for the exploration facility. These procedures and a record of the inspections will be signed by the personnel making the inspection.

Qualified employees inspect areas susceptible to leaks, spills and other identified problem areas as noted in Section 3. The focus of BMP Plan inspections will include solid and liquid materials storage, fluid transfers and solid materials handling area, activities with potential to contaminate stormwater runoff, plus disposal sites.

### 3.1.4 Security

Security, as a part of the general BMPs program will be designed to avoid releases due to accidental or intentional entry to the Spartan 151 that might result from vandalism, theft or sabotage.

The Spartan 151 already has a security plan in place, and this plan will implemented. Generally, access to the Spartan 151 will be by helicopter or boat and will be controlled through the control room on the facility as well as at the Nikiski dock. The control room will record personnel present in operating areas. This program provides for security and safety of personnel while moving to and from the exploration facility, and while at the facility.

In addition, the drilling sites are remote, offshore locations with limited access. The drilling supervisor strictly controls any transit and access to the sites. For proprietary and safety reasons, access to the Spartan 151 will be restricted to authorized persons and regulatory personnel only.

### 3.1.5 Employee Training

Furie / Beacon has developed a program to help instill in employees and understanding of the BMP Plan. This is integrated into orientation training all onsite personnel will take prior to assignment on the Spartan 151. This orientation training will include the following.

- Instructing drill crews how to properly handle fluid and products.
- Insuring all material safety data sheets (MSDS) sheets are up to date and readily available for workers to access for information.
- Informing exploration facility personnel on pollution control laws, rules and regulations.
- Receiving regular training in operations and maintenance procedures designed to prevent oil and hazardous substance discharges (Furie and/or contract personnel perform such training).
- Conducting employee briefings to tell them of any recently developed applicable precautionary pollution prevention measures.
- Discussing known spills to determine their cause and and develop corrective methods that can be used to preclude similar events.

Personnel receive training on spill prevention techniques and will be provided regulatory updates and exposed to advanced improvements in spill contingency technology. Contract employees also are regularly indoctrinated to policy on safety and environmental issues.

### 3.1.6 Recordkeeping and Reporting

As part of a BMP Plan, recordkeeping will supplement records kept as part of the ODPCP and NOI Drill Fluid Plan.

These records will include background information gathered as part of the BMP Plan, the BMP Plan itself, BMP inspection records, PM records non-compliance reports, and employee training materials. These records also will include monitoring reports as set forth in *AKG-31-5000.II(A)(B)(C)(G) and (H).*

Reporting will supplement notification requirements found in the Furie ODPCP and the Furie Drilling Fluid Plan (Attachment 2 of the NOI application). Reporting will include BMP update memorandums, verbal and written notifications by BMP inspectors detailing areas of concern noted during inspections, and correction action report from the BMP committee to the plant manager.

The BMP Committee chairperson will receive and dispense records and information, and also be responsible for record reviews, ensuring corrective actions are identified, and appropriate personnel are notified of the need to make corrections.

Records and reports will be maintained in an organized (subject and date) filing system in the Furie Anchorage office. The daily, monthly, and annual checklists will be completed by exploration facility personnel and maintained for a period of three years. A record of annual inspections on the high level alarms also will be maintained for three years. Copies of the BMP Plan are available to affected employees.

Reporting of noncompliance is accomplished by notification of supervisor by employees and subsequent notification to the field Environmental Coordinator by area supervisors.

## 3.2 Facility-specific BMPs

Facility-specific BMPS developed for exploration drilling and support operations are presented in Table 4.

| Table 4: Exploration Facility-Specific BMPs | | | | |
|---|---|---|---|---|
| **Discharge No. and/or Type** | **Outfall Composition** | **Est. Amount** | **Facility-specific Best Management Practices** | **Notes** |
| 001 Drilling Fluids | Water-based drill fluids | 35,000 bbls/well | Perform source reduction by recycle/reuse of drilling fluids after solids control.<br>• Also perform source reduction by using proper drilling techniques.<br>• Store up to 500 bbls in upright storage tanks to ensure <500 bbls/hr discharge.<br>• Discharge via shuntline below inlet water surface except during slack tide when discharge will not occur. | • Monitor/screen/sample/report per *AKG-31-5000.II(B)(1)(c) Table 1*.<br>• Track to ensure from above known hydrocarbon zones; observe for oil sheen, and perform static sheen test as required.<br>• Monitor use of NADF by drilling reports |
| 001 Drilling Cuttings | Non-hydrocarbon zone cuttings coated w/ water-based drill muds 3 | 30,000 bbls/ per well | Perform source reduction by storing up to >2,000 bbls onboard in mud pits, sand trap, de-silter and trip tanks to ensure <500 bbls/hr discharge.<br>• Also perform source reduction by using proper drilling techniques.<br>• Discharge via shuntline below inlet water surface except during slack tide when discharge will not occur.<br>• Once in hydrocarbon zone or using non-aqueous drilling fluids (NADF), no discharge | |
| Non-aqueous Drilling Fluids (NADF) | Non-aqueous drilling fluids | Not allowed under *AKG-31-5000 No discharge* | Perform source reduction by recycling/reusing drilling fluids after solids control, storing in tanks with visual level indication (manned during drilling) and transporting for onshore disposal by injection.<br>• Also perform source reduction by using proper drilling techniques.<br>• Ensure all valves possibly leading to a discharge line are tagged/locked out during storage, and all lines, hoses and fittings are in good working order prior to implementing transfer for transport.<br>• Once using non-aqueous drilling fluids (NADF), no discharge thereafter. | |
| Drilling Cuttings | Hydrocarbon zone cuttings coated with water-based or NADF drill muds | Not allowed under *AKG-31-5000 No discharge* | Perform source reduction by storing up to >2,000 bbls onboard in mud pits, sand trap, de-silter and trip tanks and transporting for onshore disposal by injection.<br>• Also perform source reduction by using proper drilling techniques.<br>• Ensure all valves possibly leading to a discharge line are tagged/locked out during storage, and all lines, hoses and fittings are in good working order prior to implementing transfer for transport.<br>• Once in hydrocarbon zone or using non-aqueous drilling fluids (NADF), no discharge. | |
| 002 Deck Drainage | Fresh water or seawater | 100 bbls/day | Perform source reduction by preventing deck drainage from coming into contact with oil by using drip pans and curbing, collection boxes, pipe manifolds, and sumps.<br>• Monitor these source reduction systems/ oil collection and containment systems, and remove oil as necessary to prevent overflow.<br>• Inspect drains and chutes on each deck to confirm there is no standing fluid around the drain indicating drainage is not occurring. If drainage is not occurring, notify the Operations Supervisor that maintenance is required.<br>• Discharge "uncontaminated" water (water not coming into contact with other fluids) overboard to surface.<br>• Treat "contaminated" water by first processing in an oil-water separator system prior to discharge by shuntline below inlet water surface. | • Monitor/screen/sample/report per *AKG-31-5000.II(C)(1) Table 2.* |
| 003 Sanitary Waste | Human waste | 100 bbls/day | Perform source reduction by treating in marine sanitation device (MSD), storing on board and then transporting to shore and treat/dispose in approved facility. Alternatively, treat and discharge offshore via shuntline below water surface.<br>• Ensure all valves possibly leading to a discharge line are tagged/locked out during storage, and all lines, hoses and fittings are in good working order prior to implementing transfer for transport. | • Monitor/screen/sample/report per *AKG-31-5000.II(C)(1) Table 4.* |
| 004 Domestic Waste | Laundry, shower and gray water | 500 bbls/day | Perform source reduction by treating in marine sanitation device (MSD), storing on board and then transporting to shore and treat/dispose in approved facility. Alternatively, treat and discharge offshore via shuntline below water surface.<br>• Ensure all valves possibly leading to a discharge line are tagged/locked out during storage, and all lines, hoses and fittings are in good working order prior to implementing transfer for transport. | • Monitor/screen/sample/report per *AKG-31-5000.II(C)(1) Table 5.* |
| 005 Desalination Unit Waste | Rejected brine from water maker unit | 200 bbls/day | Perform source reduction by storing on board (tanks with high level alarm or visual level indicators) and then transporting to shore for injection.<br>• If disposal on shore, ensure all valves possibly leading to a discharge line are tagged/locked out during storage, and all lines, hoses and fittings are in good working order prior to implementing transfer for transport.<br>• Discharge offshore via shuntline below water surface. | • Monitor/screen/sample/report per *AKG-31-5000.II(F)(1) Table 5 and (F)(2).* |
| 006 Blowout Preventer Fluid | Fluids generated during blowout | 0 bbls/day | • No discharge unless during well control emergency; discharge via diverter system over side of drill deck. | • See BCP, ODPCP and AOGCC permit to drill for BMPs. |
| 007 Boiler Blowdown | Fresh water discharge to control solids in boilers | 100 bbls/day | Perform source reduction by storing on board (tanks with high level alarm) and transporting to shore for injection.<br>• If disposal on shore, ensure all valves possibly leading to a discharge line are tagged/locked out during storage, and ensure all lines, hoses and fittings are in good working order prior to implementing transfer for transport.<br>• Discharge offshore via shuntline below inlet water surface. | • Monitor/screen/sample/report per *AKG-31-5000.II(F)(1) Table 5 and (F)(2).* |

| Table 4: Exploration Facility-Specific BMPs | | | | |
|---|---|---|---|---|
| **Discharge No. and/or Type** | **Outfall Composition** | **Est. Amount** | **Facility-specific Best Management Practices** | **Notes** |
| 008 Fire Control System Test Water | Treated seawater | 2,000 bbls/ bi-weekly test (min.) | • Discharge only during fire, blowout or system test.<br>• Discharge overboard or discharge into deck drainage (See BMPs for deck drainage). | • Monitor/screen/sample/report per *AKG-31-5000.II(F)(1) Table 5 and (F)(2).* |
| 009 Non-contact Cooling Water | Treated seawater | 50,000 bbls/d | • Determine if seawater contains chemical additives.<br>• Discharge via shuntline below inlet water surface. | • Monitor/screen/sample/report per *AKG-31-5000.II(F)(1) Table 5 and (F)(2).* |
| 010 Uncontaminated Ballast Water | Cook Inlet seawater used for preload | 1.8 MM bbls/ preload cycle | • Blake 151 to discharge transit water in federal waters prior to entering Cook Inlet.<br>• Cook Inlet seawater to be discharged overboard during preloading. | • Monitor/screen/sample/report per *AKG-31-5000.II(F)(1) Table 5 and (F)(2).* |
| 011 Bilge Water | Treated fresh water and seawater | 10 bbls/day | • Treat in oil-water separator prior to discharge.<br>• Discharge via shuntline below water surface. | • Monitor/screen/sample/report per *AKG-31-5000.II(F)(1) Table 5 and (F)(2).* |
| 012 Excess Cement Slurry | Excess cement | 200 bbls/day | • Recycle/reuse drilling fluids after solids control.<br>• Discharge via shuntline below water surface. | • Monitor/screen/sample/report per *AKG-31-5000.II(F)(1) Table 5 and (F)(2).* |
| 013 Muds, Cuttings, Cement at Seafloor | Water-based mud coated cuttings, cement | 35,000 bbls/well | • Track to ensure from above hydrocarbon zones, extra cement<br>• Avoid discharge during slack tide. | • Monitor/screen/sample/report per *AKG-31-5000.II(F)(1) Table 5 and (F)(2).* |
| 019 Test Fluids | Fluids sent downhole during testing with formational water | 500 bbls/day | • Store on board in tanks with overflow protection (high level alarms and visual level indicators) and then transport to shore for injection if hydrocarbons present. Discharge via shuntline below inlet water surface if no hydrocarbons.<br>• Ensure all valves possibly leading to a discharge line are tagged/locked out during storage, and all lines, hoses and fittings are in good working order prior to implementing disposal or transfer and transport. | • Monitor/screen/sample/report per *AKG-31-5000.II(F)(1) Table 8 and (F)(2).* |
| Trash & debris | Trash & debris during exploration | No Discharge. | • Separate by type, store in labeled containers and transport to shore for recycle and/or dispose in approved landfill. | |

# Section 4: BMP Plan Evaluation and Reevaluation Phase

Operations at Furie's exploration facility will be dynamic and subject to periodic change. As such, the BMP must be modified to reflect facility changes. At a minimum, the BMP plan will be revisited annually to ensure that if fulfills stated objectives and remains applicable.

## 4.1 Annual Exploration Facility Evaluation

### 4.1.1 Corrective Action

Based upon the results of inspections, corrective action is initiated if necessary. Significant corrective actions are documented and included in the plan at the next plan amendment.

### 4.1.2 Record Keeping and Internal Reporting Procedures

The daily, monthly, and annual checklists are completed by platform personnel and maintained for a period of three years. A record of annual inspections on the high level alarms is maintained. A three-year retention is also required for these inspections. Copies of the BMP Plan are available to affected employees.

Reporting of noncompliance is accomplished by notification of supervisor by employees and subsequent notification to the field Environmental Coordinator by area supervisors.

### 4.1.3 Best Management Practices Plan Amendments

The BMP Plan will be reviewed annually by the OIM, Spartan 151 barge engineer, Furie Operations Supervisor, and Beacon HSE Program Manager, and revised if necessary to reflect changes in design, construction, operation or maintenance which may effect the potential to release pollutants to the waters of the United States or if the plan proves to be ineffective in eliminating or minimizing pollutants from sources impacting water quality.

The plan shall be updated to include new construction activities or changes in drilling rigs if necessary.

## 4.2 Other Re-evaluation

An annual exploration facility allows for new perspectives gained through the implementation of the BMP, as well as the reflection of new directives and emerging technologies, among other factors. However, plan revisions will not be limited to annual evaluating and alteration. In some cases, Furie believes it is appropriate to evaluate the due to changed conditions such as the following:

- Restructuring of facility management
- Change in drilling rigs
- Additional drilling in the propose general permit area
- Significant changes in the drill fluids plan (see Attachment 2)
- New permits and/or new legislation related to BMPs

- Releases to the environment.

This additional plan revaluation may pinpoint areas of the exploration facility not addressed by the plan, or activities that may benefit from further development of specific BMPs or revision of the general programs contained in the BMP plan.

In conclusion, Furie believes as the BMP plan improves, cost can be further minimized as a result of source reduction (waste generation reduction), less hazardous or toxic materials use, and prevented environmental releases.